EnviroTrac
Environmental Services

May 15, 2015

Rafael Rivera
New Jersey Department of Environmental Protection
Bureau of Initial Notice and Case Assignment
401 -05H
PO Box 420
Trenton, New Jersey 08625-0420

Re: Remedial Action Report/Closure Report
Hess Corporation – Former Port Reading Complex
Area of Concern 5 – Aeration Basins
750 Cliff Road
Port Reading, Middlesex County, New Jersey
SRP PI #006148

Dear Mr. Rivera,

This Remedial Action Report for Hess Corporation - Port Reading Complex AOC 5 – Aeration Basins is being submitted by EnviroTrac Ltd. on behalf of Hess Corporation.

Should you have any questions or comments regarding the information submitted in this report, please do not hesitate to contact me at 609-387-5553, John Schenkewitz of Hess Corporation at (732) 750-6616, or the NJDEP Case Manager Phil Cole at (609) 292-0395.

Sincerely,

M. Schwartz

Melinda Schwartz
Senior Project Manager
LSRP #594328
EnviroTrac Ltd.

Cc: Phil Cole, NJDEP – BCM (3 copies+ 1 electronic)
Nidal Azzim – USEPA Region II (w/o enclosure)
Andrew Park – USEPA Region II (electronic)
John Schenkewitz, Hess Corporation (enfos)
EnviroTrac Project File

New Jersey Department of Environmental Protection
Site Remediation Program

RECEPTOR EVALUATION (RE) FORM

Date Stamp
(For Department use only)

SECTION A. SITE NAME AND LOCATION

Site Name: Hess Corporation - Former Port Reading Complex- Aeration Basins (AOC 5)

List all AKAs: Buckeye Port Reading Terminal, LLC

Street Address: 750 Cliff Road

Municipality: Port Reading (Township, Borough or City)

County: Middlesex Zip Code: 07064

Program Interest (PI) Number(s): 006148 Case Tracking Number(s): none assigned

Indicate the type of submission:

- [x] Initial RE Submission*
- [ ] Updated RE Submission

Indicate the reason for submission of an updated RE form

- [ ] Submission of an Immediate Environmental Concern (IEC) source control report;
- [ ] Submission of a Remedial Investigation Report;
- [x] Submission of a Remedial Action Report;

Check if included in updated RE

- [ ] The known concentration or extent of contamination in any medium has increased;
- [ ] A new AOC has been identified;
- [ ] A new receptor is identified;
- [ ] A new exposure pathway has been identified.

SECTION B. ON SITE AND SURROUNDING PROPERTY USE

1. Identify any sensitive populations/uses that are currently on-site or surrounding property usage within 200 feet of the site boundary (check all that apply):

	On-site	Off-site
None of the following	[x]	[x]
Residences or residential property	[ ]	[ ]
Public or Private Schools grades K-12	[ ]	[ ]
Child care centers	[ ]	[ ]
Public parks, playgrounds or other recreation areas	[ ]	[ ]
Other sensitive population use(s) Explain ______________	[ ]	[ ]

If any of the above applies, attach a list of addresses, facility names, type of use, and a map depicting each location relative to the site.

2. Current site uses (check all that apply):

- [x] Industrial
- [ ] Residential
- [ ] Commercial
- [ ] Agricultural
- [ ] School or child care
- [ ] Government
- [ ] Park or recreational use
- [x] Vacant
- [ ] Other: ______________

3. Planned future site uses and off-site use within 200 ft of site boundary (check all that apply):

- [x] Industrial
- [ ] Residential
- [ ] Commercial
- [ ] Agricultural
- [ ] School or child care
- [ ] Government
- [ ] Park or recreational use
- [x] Vacant
- [ ] Other: ______________

Provide a map depicting the location of the proposed changes in land use.

* Receptor Evaluations have been completed for this site previously, however this is the initial submittal pertaining to AOC 5.

SECTION C. DESCRIPTION OF CONTAMINATION

1. Identify if any of the following exist at the site (check all that apply):
   - ☐ Free product [N.J.A.C. 7:26E-1.8] identified is ☐ LNAPL* or ☐ DNAPL**. Date identified: ______________
   - ☒ Residual product [N.J.A.C. 7:26E-1.8]
   - ☐ Other high concentration source materials not identified above (e.g., buried drums, containers, unsecured friable asbestos)

   Explain: Residual LNAPL encountered below clay liner during install of drains. Suspect upgradient source

   * LNAPL – measured thickness of .01 feet or more

   **DNAPL – See US EPA DNAPL Overview

2. Soil Migration Pathway

   Has soil contamination been delineated to the applicable Direct Contact Soil Remediation Standard? .... ☒ Yes ☐ No

   Are all soils either below the applicable Direct Contact Criteria or under an institutional control (i.e. deed notice)? .... ☒ Yes ☐ No

3. If this evaluation is submitted with a technical document that includes contaminant summary information, proceed to Section D. Otherwise attach a brief summary of all currently available data and information to be included in the site investigation or remedial investigation report.

SECTION D. GROUND WATER USE

1. Has the requirement for ground water sampling been triggered? .... ☒ Yes ☐ No ☐ Unknown

   If "No," proceed to Section F. If "Unknown," explain:

   ____

2. Is Ground water contaminated above the Ground Water Remediation Standards [N.J.A.C.7:9C]? .... ☒ Yes ☐ No ☐ Unknown

   Or ☐ Awaiting laboratory data with the expected due date: ______________

   If "Yes," provide the date that the laboratory data was available and confirmed contamination above the Ground Water Remediation Standards. Date: unknown

   If "Unknown," explain: specific date cannot be determined - however date can be traced to prior to 5/13/2002

   If "No," or awaiting laboratory data proceed to Section F.

3. Has ground water contamination been delineated to the applicable Remediation Standard? .... ☐ Yes ☒ No

4. Has a well search been completed? .... ☒ Yes ☐ No

   Date of most recent or updated well search: 12/12/2014

   Identify if any of the following conditions exist based on the well search [N.J.A.C.7:26E-1.14(a)] (check all that apply):
   - ☐ Potable wells located within 500 feet from the downgradient edge of the currently known extent of contamination.
   - ☐ Potable well located 250 feet upgradient or 500 feet side gradient of the currently known extent of contamination.
   - ☐ Ground water contamination is located within a Tier 1 wellhead protection area (WHPA).

5. Is a completed Well Search Spreadsheet or historical well search table attached and has an electronic copy of the spreadsheet been submitted to srpgis_wrs@dep.state.nj.us. .... ☒ Yes ☐ No

   If "No," explain: ______________________________

6. Are any private potable or irrigation wells located within ½ mile of the currently known extent of contamination? .... ☐ Yes ☒ No

   If "Yes," was a door to door survey completed? .... ☐ Yes ☐ No

   If survey was not completed explain: ______________________________

7. Has sampling been conducted of ☐ potable well(s) and /or ☐ non-potable use well(s)? .... ☐ Yes ☒ No

   If "No," provide justification then proceed to Section E.

   There are no potable wells within 500 feet of the Site boundary.

8 Has contamination been identified in potable well(s) above Ground Water Remediation Standards that is not suspected to be from the site? (If "Yes," provide justification) ☐ Yes ☐ No

____

9 Has contamination been identified in potable well(s) that is above the Ground Water Remediation Standards or Federal Drinking Water Standards? ☐ Yes ☐ No

Provide date laboratory data was received: ___________________

Or ☐ awaiting laboratory data with the expected due date: __________________

If "Yes" for potable well contamination **not attributable to background**, follow the IEC Guidance Document at http://www.nj.gov/dep/srp/guidance/index.html#iec for required actions and answer the following:

Has an engineered system response action been completed on all receptors? ☐ Yes ☐ No

Provide a brief narrative description:

Date completed: _________________ NJDEP Case Manager: ____________________________

10. Were Non-potable use well(s) sampled and results were above Class II Ground Water Remediation Standards? ☐ Yes ☐ No

Provide date laboratory data was received: ______________

Or ☐ awaiting laboratory data with the expected due date: ______________

11. Has the ground water use evaluation been completed? ☐ Yes ☐ No

SECTION E. VAPOR INTRUSION (VI)

1. Contaminants present in ground water exceed the Vapor Intrusion Ground Water Screening Levels that trigger a VI evaluation. (see NJDEP Vapor Intrusion Technical Guidance). ... ☐ Yes ☒ No ☐ Unknown

Or ☐ Awaiting laboratory data and the expected due date: _________________

Provide the date that the laboratory data was available and confirmed contamination above the Vapor Intrusion Trigger Levels. Date: _________________

2. Other existing conditions that trigger a VI evaluation. (see NJDEP Vapor Intrusion Technical Guidance)

☐ Wet basement or sump containing free product or ground water containing volatile organics
☐ Methane generating conditions causing oxygen deficient or explosion concern
☐ Other human or safety concern from the VI pathway (i.e. elemental mercury, unsaturated contamination, elevated soil gas or indoor vapor (explain):

If you answered "No," or awaiting laboratory data to Question 1., *and* did not check any boxes in Question 2, proceed to Section F, "Ecological Receptors", otherwise complete the rest of this section.

3. Has ground water contamination been delineated to the applicable Ground Water Vapor Screening Level? ☐ Yes ☐ No

4. Was a site specific screening level, modeling or other alternative approach employed for the VI pathway? ☐ Yes ☐ No

5. Identify and locate on a scaled map any buildings/sensitive populations that exist within the following distances from ground water contamination with concentrations above the Vapor Intrusion Ground Water Screening Levels or specific threats (check all that apply):

☐ 30 feet of petroleum free product or dissolved petroleum hydrocarbon contamination in ground water
☐ 100 feet of any non-petroleum free product or any non-petroleum dissolved volatile organic ground water contamination
☐ No buildings exist within the specified distances

6. The vapor intrusion pathway is a concern at or adjacent to the site (if "No," attach justification) ☐ Yes ☐ No

7. Has soil gas sampling of the building(s) been conducted? ☐ Yes ☐ No ☐ N/A
If "No," or "N/A," proceed to #10

8. Has indoor air sampling been conducted at the identified building(s)? ☐ Yes ☐ No
If "No," proceed to #10

9 Has indoor air contamination been identified but not suspected to be from the site?
(if "Yes," attach justification) ☐ Yes ☐ No

10. Indoor air results were above the NJDEP's Rapid Action Levels. ☐ Yes ☐ No

Provide the date that the laboratory data was available and confirmed contamination above the Rapid Action Levels. Date: ___________________

Or ☐ Awaiting laboratory data with the expected due date: ___________________

If "Yes" to #10 above, follow the IEC Guidance Document at http://www.nj.gov/dep/srp/guidance/index.html#iec **for required actions.**

The IEC engineering system response for control was implemented for all identified structures ☐ Yes ☐ No

Date: ___________________ NJDEP Case Manager: ___________________________________

11. Indoor air sampling was conducted and results were above the NJDEP's Indoor Air Screening Levels but at or below the Rapid Action Levels ☐ Yes ☐ No

Provide the date that the laboratory data was available. Date: ___________________

Or ☐ Awaiting laboratory data with the expected due date: ___________________

If "Yes" to #11 above, answer the following:

Has the Vapor Concern (VC) Response Action Form notifying the NJDEP of the exceedances been submitted? ☐ Yes ☐ No
Date: ________________________

Has a plan to mitigate and monitor the exposure been submitted? ☐ Yes ☐ No
Date: ________________________

Has the Mitigation Response Action Report been submitted? ☐ Yes ☐ No
Date: ________________________

12. Has the vapor intrusion investigation been completed? ☐ Yes ☐ No
If "No", is the vapor intrusion investigation stepping out as part of the site investigation or remedial investigation. (If "No," attach justification) ☐ Yes ☐ No

SECTION F. ECOLOGICAL RECEPTORS

1. Has an Ecological Evaluation (EE) has been conducted? [N.J.A.C. 7:26E-1.16] ☒ Yes ☐ No

Date conducted: 12/10/2014

2. Do the results of an EE trigger a remedial investigation of ecological receptors? [N.J.A.C. 7:26E-4.8] ☒ Yes ☐ No

3. Has a remedial investigation of ecological receptors been conducted? ☐ Yes ☒ No

Date conducted: ___________________

4. Provide the following information for any surface water body on or within 200 feet of the site:

Surface Water Body Name	Stream Classification	Antidegradation Designation	Trout Production	Trout Maintenance
Smith Creek	FW2-NT/SE3		☐	☐
Smith Creek Detention Basin			☐	☐
			☐	☐
			☐	☐
			☐	☐
			☐	☐

5. Does the site contain any features regulated by the Land Use Regulation Program (LURP)? (e.g. wetlands, flood hazard area, tidelands, etc.). ☐ Yes ☒ No

   If "Yes," identify the type(s) of features: ______

6. Have any formal LURP jurisdiction letters or approvals been issued for the site? ☐ Yes ☒ No

   If "Yes," what is the LURP Program Interest (PI) number(s) for the site? ______

7. Have any applications for formal LURP jurisdiction letters or approvals been submitted the NJDEP? ☐ Yes ☒ No

   If "Yes," what is the LURP Program Interest (PI) number(s) for the site? ______

8. Is free product or residual product located within 100 feet from an ecological receptor? ☐ Yes ☒ No

9. Available data indicate an impact on: ☐ Ecological receptor(s) ☐ Surface water ☐ Sediment

   If this evaluation is submitted with a technical document that includes contaminant summary information, proceed to Section G. Otherwise attach a description of the type of contamination and provide a schedule and a description of all actions to be taken to mitigate exposure.

SECTION G. PERSON RESPONSIBLE FOR CONDUCTING THE REMEDIATION INFORMATION AND CERTIFICATION

Full Legal Name of the Person Responsible for Conducting the Remediation: Hess Corporation

Representative First Name: John Representative Last Name: Schenkewitz

Title: Manager, Remediation

Phone Number: (732) 750-6616 Ext: ______ Fax: (732) 750-6805

Mailing Address: One Hess Plaza

City/Town: Woodbridge State: ______ Zip Code: 07095

Email Address: jschenkewitz@hess.com

This certification shall be signed by the person responsible for conducting the remediation who is submitting this notification in accordance with Administrative Requirements for the Remediation of Contaminated Sites rule at N.J.A.C. 7:26C-1.5(a).

I certify under penalty of law that I have personally examined and am familiar with the information submitted herein, including all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, to the best of my knowledge, I believe that the submitted information is true, accurate and complete. I am aware that there are significant civil penalties for knowingly submitting false, inaccurate or incomplete information and that I am committing a crime of the fourth degree if I make a written false statement which I do not believe to be true. I am also aware that if I knowingly direct or authorize the violation of any statute, I am personally liable for the penalties.

Signature: John Schenkewitz Date: 5/13/15

Name/Title: John Schenkewitz / Manager, Remediation **No Changes Since Last Submittal** ☒

SECTION H. LICENSED SITE REMEDIATION PROFESSIONAL INFORMATION AND STATEMENT

LSRP ID Number: 594328

First Name: Melinda Last Name: Schwartz

Phone Number: (267) 319-6924 Ext: Fax: (609) 387-5533

Mailing Address: 6 Terri Lane, Suite 350

City/Town: Burlington State: NJ Zip Code: 08016

Email Address: mindys@envirotrac.com

I certify that I am a Licensed Site Remediation Professional authorized pursuant to N.J.S.A. 58:10C to conduct business in New Jersey. I:

[SELECT ONE OR BOTH OF THE FOLLOWING AS APPLICABLE]:

☐ *directly oversaw and supervised all of the referenced remediation, and\or*

☒ *personally reviewed and accepted all of the referenced remediation presented herein.*

I believe that the information contained herein, and including all attached documents, is true, accurate and complete.

It is my independent professional judgment and opinion that the remediation conducted at this site, as reflected in this submission to the Department, conforms to, and is consistent with, the remediation requirements in N.J.S.A. 58:10C-14.

My conduct and decisions in this matter were made upon the exercise of reasonable care and diligence, and by applying the knowledge and skill ordinarily exercised by licensed site remediation professionals practicing in good standing, in accordance with N.J.S.A. 58:10C-16, in the State of New Jersey at the time I performed these professional services.

I am aware pursuant to N.J.S.A. 58:10C-17 that for purposely, knowingly or recklessly submitting false statement, representation or certification in any document or information submitted to the board or Department, etc., that there are significant civil, administrative and criminal penalties, including license revocation or suspension, fines and being punished by imprisonment for conviction of a crime of the third degree.

LSRP Signature: M Schwartz Date: 5/15/15

LSRP Name/Title: Melinda Schwartz / Senior Project Manager **No Changes Since Last Submittal** ☐

Company Name: EnviroTrac Ltd.

Completed forms should be sent to the municipal clerk, designate health department, and:

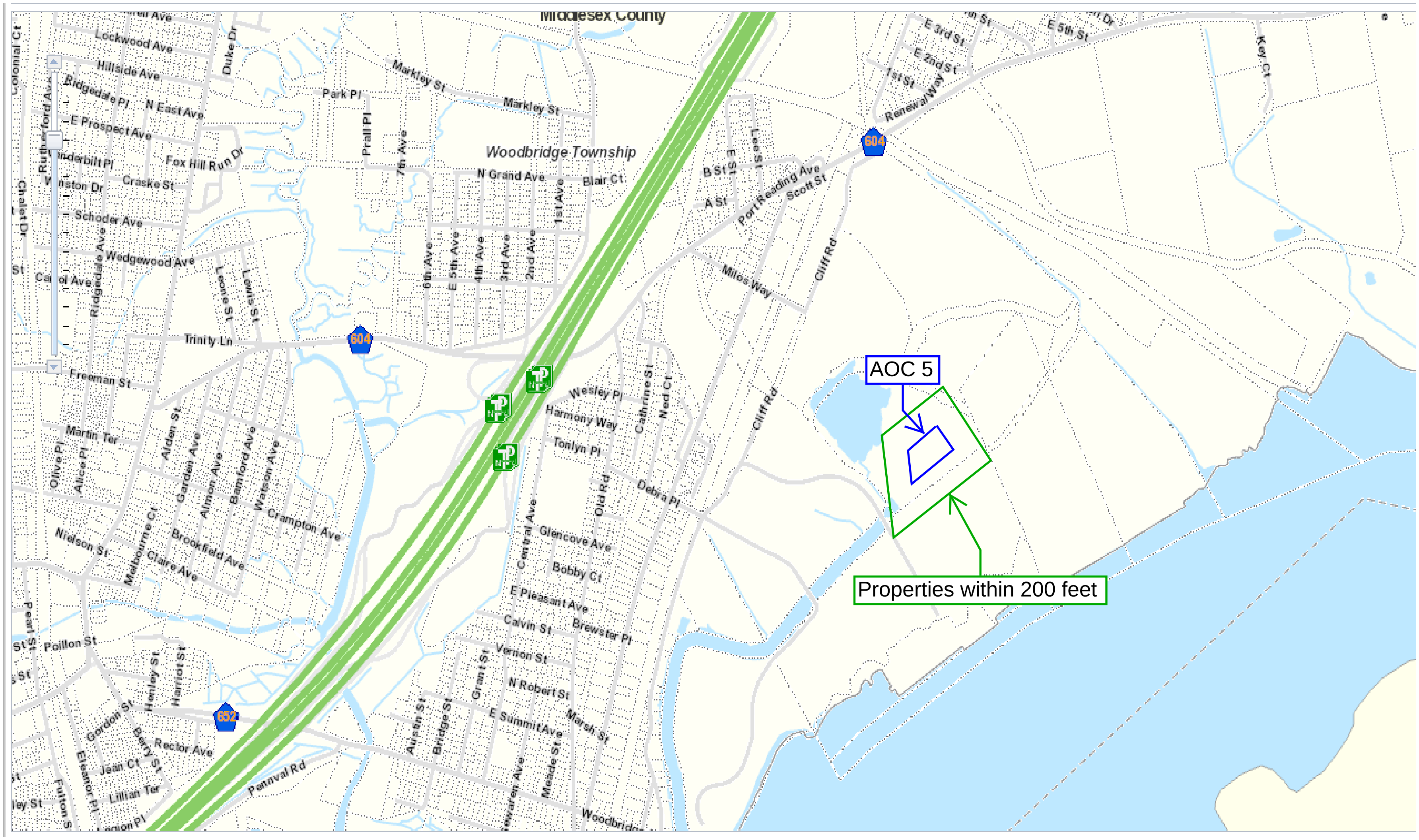
Bureau of Case Assignment & Initial Notice
Site Remediation Program
NJ Department of Environmental Protection
401-05H
PO Box 420
Trenton, NJ 08625-0420

Receptor Evaluation Form – Additional Information
Hess Corporation – Former Port Reading Complex – Aeration Basin Area
750 Cliff Road, Port Reading, NJ 07064 (PI #006148)

B.1. The required information has been included on the attached map and corresponding property ownership/use spreadsheet.

H. The Municipal Clerk and Health Departments of Middlesex County and Woodbridge Township have been copied on this submittal as identified below:

Municipal Clerk	Mr. John M. Mitch	Woodbridge Township Municipal Building 1 Main Street Woodbridge, NJ 07095
Health Department	Lester Jones Director	County of Middlesex Public Health Department Middlesex County Administration Building, 5th Floor John F. Kennedy Square New Brunswick, NJ 08901
	Philip Bujaski Chief	Woodbridge Dept. of Health & Human Services 2 George Frederick Plaza Woodbridge, NJ 07095


Middlesex County
Woodbridge Township
AOC 5
Properties within 200 feet
Lockwood Ave
Hillside Ave
Ridgedale Pl
N East Ave
E Prospect Ave
Fox Hill Run Dr
Craske St
Schoder Ave
Wedgewood Ave
Trinity Ln
Freeman St
Martin Ter
Crampton Ave
Brookfield Ave
Claire Ave
Nielson St
Poillon St
Rector Ave
Jean Ct
Lillian Ter
Pennval Rd
Park Pl
Prall Pl
Markley St
N Grand Ave
Blair Ct
Wesley Pl
Harmony Way
Tonlyn Pl
Debra Pl
Glencove Ave
Bobby Ct
E Pleasant Ave
Calvin St
Brewster Pl
Vernon St
N Robert St
E Summit Ave
Marsh St
Port Reading Ave
Scott St
Milos Way
Cliff Rd
Renewal Way
E 3rd St
E 2nd St
1st St
E 5th St
Key Ct
604
652

Hess Corporation - Former Port Reading Complex- Aeration Basin Area (AOC 5)
750 Cliff Road
Port Reading, Middlesex County, New Jersey
Area Land Use Table
Properties within 200 feet of AOC 5

Block	Lot	Owner	Address	Owner Address	City	State	Zip	Property Use
760	1.01	PSE&G Power/Fossil, LLC	251 Cliff Road	80 Park Plaza	Newark	NJ	07102	Industrial
760	6	Buckeye Port Reading LLC	750 Cliff Road	PO Box 56169	Houston	TX	77256	Industrial (Site)
760.01	2	Buckeye Port Reading LLC	S Creek & S.I. Sound	PO Box 56169	Houston	TX	77256	Industrial

Hess Corporation Port Reading Complex
Wells within 1.0 mile of SPC (562634, 629071) - NJDEP XY Well Search for SRP Receptor Evaluation Requirements
December 12, 2014

Permit Number	Well Use	Potentially Potable	Document	Date (permitted/drilled/sealed)	Physical Address	County	Municipality	Block	Lot	Location Method	Easting (X)	Northing (Y)	Distance (feet)	Depth (ft)	Capacity (gal/min)
2900057595	Irrigation	Yes	Record	6/18/2008	136 AVENUE OF TWO RIVERS	Monmouth	Rumson Boro	97	45	GPS	558480	633698	6218	182	20
2600000004	Industrial	Yes	Permit	11/19/1947	NA	Middlesex	Woodbridge Twp	NA	NA	Prop Loc - Hard Copy	562227	632787	NA	100	6
2600000003	Industrial	Yes	Permit	11/19/1947	NA	Middlesex	Woodbridge Twp	NA	NA	Prop Loc - Hard Copy	562227	632787	NA	100	6
2600000360	Domestic	Yes	Permit	9/25/1951	NA	Union	Rahway City	NA	NA	Prop Loc - Hard Copy	558140	631461	NA	90	15
2600000238	Domestic	Yes	Permit	12/20/1950	NA	Middlesex	Woodbridge Twp	NA	NA	Prop Loc - Hard Copy	558137	632776	NA	300	5
2600000238	Domestic	Yes	Record	12/30/1950	72 2ND AVE	Middlesex	Woodbridge Twp	632	104	Prop Loc - Dig Image	558605	630787	4379	146	4
2600001353	Domestic	Yes	Permit	1/26/1956	NA	Middlesex	Woodbridge Twp	NA	NA	Prop Loc - Hard Copy	556057	631455	NA	100	10
2600001829	Industrial	Yes	Permit	4/24/1958	NA	Middlesex	Woodbridge Twp	NA	NA	Prop Loc - Hard Copy	564322	628746	NA	100	50
2600001829	Industrial	Yes	Record	5/28/1958	PORT READING AVE	Middlesex	Woodbridge Twp	NA	NA	Prop Loc - Dig Image	562717	632148	3078	168	0
2600004315	Industrial	Yes	Permit	11/5/1969	NA	Middlesex	Woodbridge Twp	NA	NA	Prop Loc - Hard Copy	558137	632776	NA	200	69
2600004315	Industrial	Yes	Record	11/21/1969	100 MARKLEY ST	Middlesex	Woodbridge Twp	603	11	Prop Loc - Hard Copy	558137	632776	NA	600	0
2600003382	Domestic	Yes	Permit	8/4/1965	NA	Essex	Nutley Twp	NA	NA	Prop Loc - Hard Copy	557060	631458	NA	200	10
2600003378	Domestic	Yes	Permit	8/4/1965	NA	Essex	Nutley Twp	NA	NA	Prop Loc - Hard Copy	557060	631458	NA	200	10
2600003135	Domestic	Yes	Record	4/28/1965	117 LARCH ST.	Middlesex	Woodbridge Twp	NA	NA	Prop Loc - Dig Image	565800	633506	5449	100	0
2600005078	Domestic	Yes	Record	3/28/1981	RAHWAY AVE	Middlesex	Woodbridge Twp	1006	24	Prop Loc - Dig Image	556537	634829	8387	300	10
2600007289	Industrial	Yes	Record	1/18/1985	MAPLEWOOD AVE	Middlesex	Woodbridge Twp	918A	1	Prop Loc - Dig Image	559631	632139	4293	560	0

NA- Information not available

New Jersey Department of Environmental Protection
Site Remediation Program

REMEDIAL ACTION REPORT FORM

Date Stamp
(For Department use only)

SECTION A. SITE NAME AND LOCATION

Site Name: Hess Corporation - Former Port Reading Complex - Aeration Basins (AOC 5)

List all AKAs: Buckeye Port Reading Terminal, LLC

Street Address: 750 Cliff Road

Municipality: Port Reading (Township, Borough or City)

County: Middlesex Zip Code: 07064

Program Interest (PI) Number(s): 006148

Case Tracking Number(s) for this submission: none assigned

Date Remediation Initiated Pursuant to N.J.A.C. 7:26C-2: 02/27/1987

State Plane Coordinates for a central location at the site: Easting: 560882.68 Northing: 630201.18

Municipal Block(s) and Lot(s):

Block #: 760	Lot #: 6	Block #:	Lot #:
Block #:	Lot #:	Block #:	Lot #:
Block #:	Lot #:	Block #:	Lot #:
Block #:	Lot #:	Block #:	Lot #:

SECTION B. SUBMISSION STATUS

1. Indicate how the Electronic Data Deliverable (EDD) for this submission is being provided to the NJDEP:

☒ Via Email at srpedd@dep.state.nj.us (attach NJDEP confirmation email); or
☐ CD (attach to this submission)
☐ Not Applicable – No EDD

2. Complete the following Submission and Permit Status Table:

	N/A	Included in this Submission	Previously Submitted	Date of Submission	Date of Revised Submission	Date of Previous NJDEP Approval	Date of Document Withdrawal
Alternative Soil Remediation Standard and/or Screening level Application Form	☒	☐	☐				
Case Inventory Document		☒					
Discharge to Ground Water Permit by Rule Authorization Request	☒	☐	☐				
IEC Engineered System Response Action Report	☒	☐	☐				
Immediate Environmental Concern Report	☒	☐	☐				
LNAPL Interim Remedial Measure Report	☐	☐	☒	03/01/2012			
Preliminary Assessment Report	☒	☐	☐				
Public Notification	☐	☐	☒	07/15/2014			
Receptor Evaluation	☐	☒	☐				
Remedial Action Report	☐	☒	☐				
Remedial Action Work Plan	☒	☐	☐				
Remedial Investigation Report	☒	☐	☐				

Response Action Outcome	☒	☐	☐				
Site Investigation Report	☒	☐	☐				
Technical Impracticability Determination	☒	☐	☐				
Vapor Concern Mitigation Report	☒	☐	☐				
Permit Application – list:	☒						
		☐	☐				
		☐	☐				
		☐	☐				
		☐	☐				
Radionuclide Remedial Investigation Workplan	☒	☐	☐				
Radionuclide Remedial Investigation Report	☒	☐	☐				
Radionuclide Remedial Action Workplan	☒	☐	☐				
Radionuclide Remedial Action Report	☒	☐	☐				

SECTION C. SITE USE

Current Site Use *(check all that apply)*

☒ Industrial ☐ Agricultural
☐ Residential ☐ Park or recreational use
☐ Commercial ☒ Vacant
☐ School or child care ☐ Government
☐ Other: ____________________

Intended Future Site Use *(check all that apply)*

☒ Industrial ☐ Park or recreational use
☐ Residential ☒ Vacant
☐ Commercial ☐ Government
☐ School or child care ☐ Future site use unknown
☐ Other: ____________________

SECTION D. CASE TYPE: *(check all that apply)*

☐ Administrative Consent Order (ACO)
☐ Brownfield Development Area (BDA)
☐ Child Care Facility
☐ Chrome Site (Chromate chemical production waste)
☐ Coal Gas
☐ Due Diligence with RAO
☐ Hazardous Discharge Remediation Fund (HDSRF) Grant/Loan
☐ ISRA
☐ Landfill (SRP subject only)
☐ Regulated Underground Storage Tank (UST)
☐ Remediation Agreement (RA)/ Remediation Certification
☐ School Development Authority (SDA)
☐ School facility
☐ Spill Act Defense – Government Entity
☐ Spill Act Discharge
☐ UST Grant/Loan
☒ Other: HSWA - Closure

Federal Case *(check all that apply)*

☒ RCRA GPRA 2020 ☐ CERCLA/NPL ☐ USDOD ☐ USDOE

1. Is the party conducting remediation a government entity? .... ☐ Yes ☒ No
   If "Yes," check one: ☐ Federal ☐ State ☐ Municipal ☐ County

SECTION E. PUBLIC FUNDS

Did the remediation utilize public funds?........ ☐ Yes ☒ No

If "Yes," check applicable:

☐ UST Grant ☐ UST Loan ☐ Brownfield Reimbursement Program
☐ HDSRF Grant ☐ HDSRF Loan ☐ Landfill Reimbursement Program
☐ Spill Fund ☐ Schools Development Authority ☐ Environmental Infrastructure Trust

SECTION F. SCOPE OF REMEDIAL ACTION REPORT

1. Does the RAR address:
   ☒ Area(s) of Concern (AOCs) Only
   ☐ Entire Site (Based on a completed and submitted Preliminary Assessment/Site Investigation)
2. Total number of contaminated AOCs associated with the case: 18

3. Total number of contaminated AOCs addressed in this submission: 1

4. Are there any outstanding contaminated AOCs associated with the case where the remedial action has NOT been performed?............ ☒ Yes ☐ No

When answering the remaining questions on this form consider only the AOCs addressed in this submission.

SECTION G. GENERAL

1. Does this submission include Remedial Action Permit Application(s) that require Site Remediation Program approval? .... ☐ Yes ☒ No
2. Was a remediation initiated after May 6, 2010, for new construction or a change in the use of the site proposed for the purpose of residential use, use as a licensed child care center or use as a school?............ ☐ Yes ☒ No

   If "Yes," was an unrestricted use or a presumptive remedy implemented? .... ☐ Yes ☐ No
3. Was an alternative remedy approved by the NJDEP? .... ☐ Yes ☒ No

   If "Yes," provide the date of the approval: ______________________
4. Has the remediation varied from the Technical Rules?............ ☐ Yes ☒ No

   If "Yes." provide the citation(s) from which the remediation has varied and the page(s) in the attached document where the rationale for the variance is provided.

   N.J.A.C. 7:26E- ________________________ Page ________________________

   N.J.A.C. 7:26E- ________________________ Page ________________________

   N.J.A.C. 7:26E- ________________________ Page ________________________
5. Were the laboratory Reporting Limits below applicable remediation standards/screening levels criteria required for the contaminants of concern for the AOCs addressed in this submission?............ ☒ Yes ☐ No
6. Have past NJDEP-documented deficiencies been addressed in this submission? .... ☐ Yes ☐ No ☒ N/A
7. Did the remediation deviate from that proposed in the Remedial Action Workplan? .... ☐ Yes ☒ No

   If "Yes," specify the section/page(s) in the report where the deviation(s) are discussed:

   ____
8. Did the remedial action render the property unusable for future redevelopment or for recreational use (N.J.A.C. 7:26C-6.4(b)? .... ☐ Yes ☒ No

SECTION H. SITE CONDITIONS

1. At any time, was there any radiological contamination detected at the AOCs addressed in this submission? .... ☐ Yes ☒ No
2. At any time, did any of the AOCs addressed in this submission contain Ordnance and Explosives/ Unexploded Ordnance (OE/UXO)? .... ☐ Yes ☒ No
3. Did the remedial action involve containment of free product?............ ☐ Yes ☒ No
4. Has dioxin been detected at levels above NJDEP's interim direct contact soil screening level of 50 ppt dioxin TEQ (TCDD Toxicity Equivalence Quotient) in any AOCs addressed in this submission?............ ☐ Yes ☒ No
5. Have any of the following contaminants *ever* been detected in sediment above the ecological screening levels at the AOCs addressed in this submission?............ ☐ Yes ☒ No

   If "Yes," check all that apply:

   ☐ Arsenic ☐ Dioxin ☐ Mercury ☐ PCBs ☐ Pesticides
6. Is remediation complete in all affected media at the AOCs addressed in this submission? .... ☐ Yes ☒ No
7. Did contaminants from the AOCs addressed in this submission discharge to surface water? .... ☐ Yes ☒ No
8. Did contaminants from the AOCs addressed in this submission discharge to an Environmentally Sensitive Natural Resource (ESNR)? .... ☐ Yes ☒ No

9. Are any of the following conditions currently present for the AOCs addressed in this submission? *(check all that apply):*

Groundwater:

☒ Contaminated ground water in the overburden aquifer
☐ Contaminated ground water in a confined aquifer
☐ Contaminated ground water in the bedrock aquifer
☐ Contaminated ground water in multiple aquifer units
☐ Multiple distinct ground water plumes
☐ Contaminated ground water migrating off-site
☐ Natural background ground water contamination
☐ Contaminated ground water discharging to surface water or Environmentally Sensitive Natural Resource (ESNR)
☐ Residual or free product
☐ Radionuclides

Soil:

☐ On-site discharge(s) impacting soil off-site
☐ Chromate Chemical Production Waste/COPR
☐ Munitions and explosives of concern
☐ Contaminated soil in the saturated zone
☐ Historic pesticide impacts to soil
☐ Residual or free product
☐ Radionuclides
☒ Historic Fill
☐ Natural background only above Impact to Ground Water Cleanup Criteria
☐ Natural background above Direct Contact Remediation Standards
☐ Soil contamination in an ESNR

SECTION I. APPLICABLE REMEDIATION STANDARDS

1. Were Default Remediation Standards used for all contaminants? .... ☒ Yes ☐ No

If "Yes," check all that apply:

☒ Direct Contact
☒ Impact to Ground Water Soil Screening Levels
☒ Ecological Screening Levels

2. Has compliance averaging been utilized to determine compliance with the Soil Remediation Standards?.. ☐ Yes ☒ No

If "Yes," check all that apply:

Compliance Averaging Method Utilized

Pathway	Arithmetic Mean	95 Percent UCL	Spatially Weighted Average	75 Percent/ 10X Procedure
☐ Ingestion-Dermal Pathway	☐	☐	☐	☐
☐ Inhalation Pathway	☐	☐	☐	☐
☐ Impact to Ground Water Pathway	☐	☐	☐	☐

3. Has a compliance option been utilized to determine compliance with the Impact to Ground Water Pathway? (If "Yes," check all that apply).. ☐ Yes ☒ No

☐ Immobile Compounds
☐ Data evaluation for metals and semi-volatiles
☐ Data evaluation for volatile organics derived from discharges of petroleum mixtures

4. Was an interim standard used for a contaminant where a standard does not exist? .... ☐ Yes ☒ No
5. Were Alternate Remediation Standards used for the Ingestion/Dermal Pathway? .... ☐ Yes ☒ No
6. Were Alternate Remediation Standards used for the Inhalation Pathway?.. ☐ Yes ☒ No
7. Were Site Specific Standards used for the Impact to Ground Water Pathway? .... ☐ Yes ☒ No

If "Yes," check all that apply:

☐ Soil-Water Partitioning Equation ☐ SPLP ☐ Sesoil ☐ Sesoil/AT123D
☐ DAF Modification

8. Were Site Specific Ecological Remediation Goals used?.. ☐ Yes ☒ No
9. What is the ground water classification for this site as per N.J.A.C. 7:9C? (check all that apply)

☐ Class I-A ☒ Class II-A
☐ Class I-PL Pinelands Protection Area ☐ Class III-A
☐ Class I-PL Pinelands Preservation Area ☐ Class III-B

SECTION J. ALTERNATIVE AND CLEAN FILL USE

1. Was alternative fill used? ☒ Yes ☐ No
2. Was clean fill used? ☒ Yes ☐ No
3. Was material sent off-site for use as alternative and/or clean fill? ☐ Yes ☒ No
   If "Yes," specify the section/page in the RAR where it states the SRP site receiving this alternative and/or clean fill: ______
4. Was material sent off-site for use as alternative and/or clean fill at a non-SRP site? ☐ Yes ☒ No
   If "Yes," specify the section/page in the RAR where it states the non-SRP site receiving this alternative and/or clean fill: ______
5. Was alternative fill used in excess of the amount required for the remedial action? ☐ Yes ☒ No
   If "Yes," was the NJDEP's preapproval obtained pursuant to N.J.A.C. 7:26E-5.2(b)3? ☐ Yes ☐ No

SECTION K. REMEDIAL ACTION REPORT INFORMATION

Soils

1. Did the remedy include a remedial action for soils? ☒ Yes ☐ No
   If "No," skip to **Ground Water**
2. Is a restricted use required? ☒ Yes ☐ No
   If "Yes," indicate the type of restriction being implemented. Deed Notice and Cap
3. If applicable, has consent from all involved property owners been obtained (i.e., for institutional or engineering controls)? ☒ Yes ☐ No
4. Was an engineering control required? ☒ Yes ☐ No
   If "Yes," indicate the receptor(s) each engineering control is intended to protect. *(check all that apply)*
   ☒ Human ☒ Ecological ☐ Offsite Impacts

Ground Water

5. Did the remedy include a remedial action for ground water? ☐ Yes ☒ No
   If "No," skip to **Ecological**
6. Is a restricted use required for ground water? ☐ Yes ☐ No
7. Is a revised CEA required? ☐ Yes ☐ No
8. Do any contaminant levels in ground water currently exceed the vapor intrusion ground water trigger? ☐ Yes ☐ No

Ecological

9. Did the remedy include a remedial action for Environmentally Sensitive Natural Resources (ESNRs)? ☐ Yes ☒ No
   If "No," skip to **Indoor Air**
10. Was post-remedial sampling performed to determine whether contaminant levels currently meet ecological screening levels or ecological remediation goals? ☐ Yes ☐ No
11. Did the remedial action require filling of State open waters or wetlands? ☐ Yes ☐ No
12. Have ecological risk-based remediation goals been developed? ☐ Yes ☐ No
    If "Yes," have the ecological risk-based remediation goals been approved by NJDEP? ☐ Yes ☐ No
13. Have Risk Management Decision (RMD) goals been developed? ☐ Yes ☐ No
    If "Yes," have the RMD goals been approved by NJDEP? ☐ Yes ☐ No

Indoor Air

14. Have any vapor intrusion engineering controls/mitigation systems been installed in order to mitigate a vapor condition in a structure? ☐ Yes ☒ No

If "Yes," check each type of engineering control that was implemented:

☐ Subsurface Depressurization System
☐ Subsurface Ventilation System
☐ Soil Vapor Extraction System
☐ HVAC Positive Pressure
☐ Other (specify): ____________________

SECTION L. PERSON RESPONSIBLE FOR CONDUCTING THE REMEDIATION INFORMATION AND CERTIFICATION

Full Legal Name of the Person Responsible for Conducting the Remediation: Hess Corporation

Representative First Name: John Representative Last Name: Schenkewitz

Title: Manager, Remediation

Phone Number: (732) 750-6616 Ext: ____ Fax: (732) 750-6805

Mailing Address: One Hess Plaza

City/Town: Woodbridge State: NJ Zip Code: 07095

Email Address: jschenkewitz@hess.com

This certification shall be signed by the person responsible for conducting the remediation who is submitting this notification in accordance with Administrative Requirements for the Remediation of Contaminated Sites rule at N.J.A.C. 7:26C-1.5(a).

I certify under penalty of law that I have personally examined and am familiar with the information submitted herein, including all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, to the best of my knowledge, I believe that the submitted information is true, accurate and complete. I am aware that there are significant civil penalties for knowingly submitting false, inaccurate or incomplete information and that I am committing a crime of the fourth degree if I make a written false statement which I do not believe to be true. I am also aware that if I knowingly direct or authorize the violation of any statute, I am personally liable for the penalties.

Signature: John Schenkewitz Date: 5/13/15

Name/Title: John Schenkewitz/ Manager, Remediation

No changes to contact information since last submission ☐

SECTION M. LICENSED SITE REMEDIATION PROFESSIONAL INFORMATION AND STATEMENT

LSRP ID Number: 594328

First Name: Melinda Last Name: Schwartz

Phone Number: (267) 319-6924 Ext: Fax: (609) 387-5533

Mailing Address: 6 Terri Lane, Suite 350

City/Town: Burlington State: NJ Zip Code: 08016

Email Address: mindys@envirotrac.com

This statement shall be signed by the LSRP who is submitting this notification.

I certify that I am a Licensed Site Remediation Professional authorized pursuant to N.J.S.A. 58:10C to conduct business in New Jersey. I:

[SELECT ONE OR BOTH OF THE FOLLOWING AS APPLICABLE]:

☐ *directly oversaw and supervised all of the referenced remediation, and\or*

☒ *personally reviewed and accepted all of the referenced remediation presented herein.*

I believe that the information contained herein, and including all attached documents, is true, accurate and complete.

It is my independent professional judgment and opinion that the remediation conducted at this site, as reflected in this submission to the Department, conforms to, and is consistent with, the remediation requirements in N.J.S.A. 58:10C-14.

My conduct and decisions in this matter were made upon the exercise of reasonable care and diligence, and by applying the knowledge and skill ordinarily exercised by licensed site remediation professionals practicing in good standing, in accordance with N.J.S.A. 58:10C-16, in the State of New Jersey at the time I performed these professional services.

I am aware pursuant to N.J.S.A. 58:10C-17 that for purposely, knowingly or recklessly submitting false statement, representation or certification in any document or information submitted to the board or Department, etc., that there are significant civil, administrative and criminal penalties, including license revocation or suspension, fines and being punished by imprisonment for conviction of a crime of the third degree.

LSRP Signature: M Schwartz Date: 5/15/15

LSRP Name/Title: Melinda Schwartz / Senior Project Manager

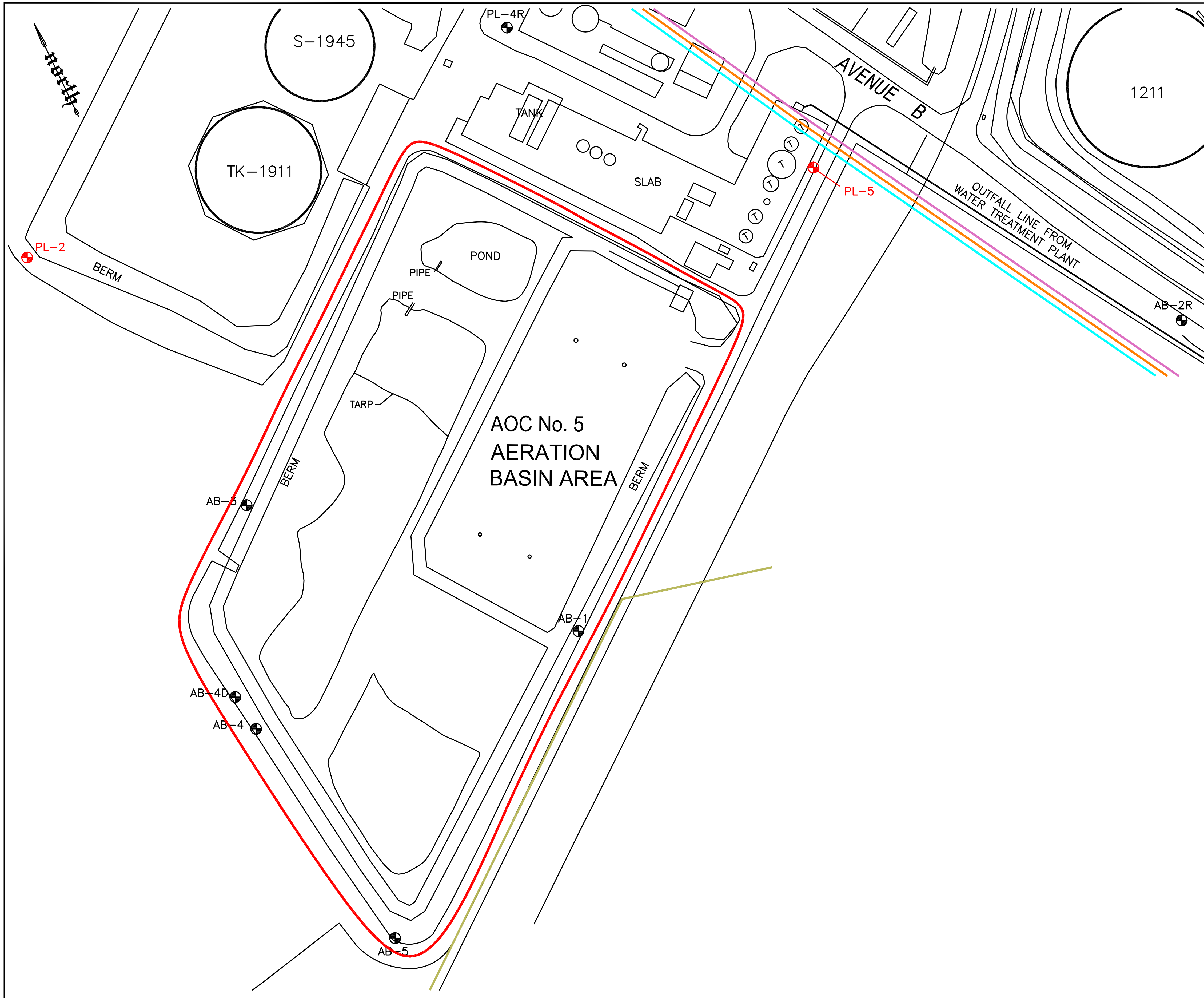
Company Name: EnviroTrac Ltd.

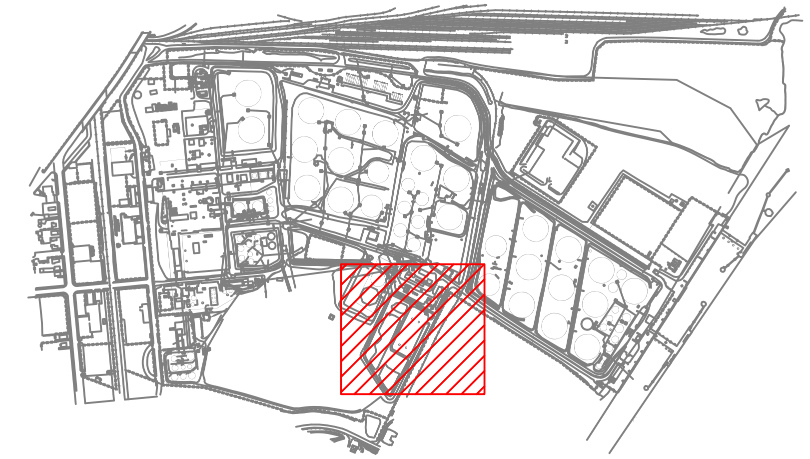
No changes to contact information since last submission ☐

Completed forms should be sent to:

Bureau of Case Assignment & Initial Notice
Site Remediation Program
NJ Department of Environmental Protection
401-05H
PO Box 420
Trenton, NJ 08625-0420

	A	B	D	E	F	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
1	**Case Name:**	Hess Corporation - Former Port Reading Complex																		
2	**PI #:**	006148																		
3	**IMPORTANT**: *Do not copy and paste into more than 1 cell at a time because it can disrupt hidden equations*																			
4	**Case Inventory Document Version 1.3 06/25/14**																			
5	**AOC ID**	**AOC Type**	**AOC Details**	**Confirmed Contamination**	**AOC Status**	**Status Date**	**Incident #**	**DEP AOC Number**	**Contaminated Media**	**Contaminants of Concern**	**Additional Contaminants of Concern**	**Additional Contaminants of Concern**	**Applicable Remediation Standard**	**Exposure Route**	**Additional Exposure Route**	**RA Type**	**Additional RA Type**	**Additional RA Type**	**Was an Order of Magnitude Evaluation Conducted?**	**Activity**
6	AOC 5	Storage and staging area - Surface impoundment and lagoon	Former Aeration Basins	Yes	RAR	5/15/2015			Mixed Media	VO+ Metals			Remediation Standards	Ingestion/Dermal		Excavation	Capping			February 1987 - Closure Plan submitted to NJDEP and conditionally approved in correspondence dated March 26, 1987. July 2014 - Aeration basins infilled pursuant to approved Closure Plan. May 2015 - RAR/Closure Report submitted to NJDEP.
7																				
8																				
9																				
10																				
11																				





LOCATION MAP
(NOT TO SCALE)

LEGEND

- MONITORING WELL LOCATION
- TRANS CONTINENTAL PIPELINE
- MOBILE PIPELINE
- 12" TEXAS EASTERN
- 10" TEXAS EASTERN
- RAILROAD
- FENCE

FIGURE # 1	HESS CORPORATION 750 CLIFF ROAD PORT READING, NEW JERSEY HESS	AOC 5 – AERATION BASIN AREA DRAWN BY: CM — REVISION DATE: 12/8/14	0 100 SCALE IN FEET	EnviroTrac ENVIRONMENTAL SERVICES 400E CORPORATE COURT, So. PLAINFIELD NJ 07080 PHONE: (908)757–1900 FAX: (908)757–0017

REMEDIAL ACTION REPORT / CLOSURE REPORT

Hess Corporation
750 Cliff Road
Port Reading, Middlesex County, New Jersey

Aeration Basin Area
SRP PI #006148

May 15, 2015

Prepared for:

John Schenkewitz
Manager, Remediation
Hess Corporation
1 Hess Plaza
Woodbridge, NJ 07095-1229

Prepared by:

EnviroTrac Ltd.
6 Terri Lane, Suite #350
Burlington, NJ 08016

Prepared By:

Frank Rooney

Francis Rooney
Project Manager

Reviewed By:

Sarah J. Dyson

Sarah J. Dyson
Project Manager

Reviewed By:

M Schwartz

Melinda Schwartz
Senior Project Manager
LSRP # 594328

EnviroTrac
Environmental Services

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FIGURES

TABLES

APPENDICES

Remedial Action Report / Closure Report
Hess Corporation – Former Port Reading Complex
Area of Concern 5 – Aeration Basins
750 Cliff Road
Port Reading, Middlesex County, New Jersey

1.0 Introduction

EnviroTrac Ltd. (ET) has been retained by Hess Corporation (Hess) to provide environmental consulting services with regard to subsurface conditions at the Hess Corporation – Former Port Reading Complex (HC-FPR). HC-FPR is located at 750 Cliff Road in Port Reading, Middlesex County, New Jersey. **Figure 1** is a United States Geological Survey (USGS) 7.5 Minute Series Quadrangle Map (Arthur Kill, New Jersey) depicting the complex and associated land features. The New Jersey Department of Environmental Protection (NJDEP) Preferred Identification Number for the complex 006148.

This Remedial Action Report/Closure Report (RAR/CR) presents the closure activities of three (3) former Aeration Basins in designated Area of Concern (AOC) 5 – Aeration Basins. These adjoining basins were located in the southeast corner of HC-FPR, immediately southwest of the facility wastewater treatment system, and parallel to the southeast fence line adjoining the PSEG Power LLC property. The location of AOC 5 is shown on **Figure 2**, and a Site Plan for AOC 5 is included as **Figure 3**.

The Aeration Basins were originally identified as a Solid Waste Management Unit (SWMU) within HC-FPR's Hazardous and Solid Waste Amendments Permit (HSWA) # NJD045445483; but was removed prior to 1985 when the USEPA confirmed that the basins did not meet the definition of Treatment, Storage, or Disposal (TSD) facilities under the Resource Recovery and Conservation Act (RCRA).

2.0 Historical and Background Information

2.1 Facility Historical Information

HC-FPR bulk petroleum storage and refining operations were initiated in 1958 with a Crude Topping Unit and underwent various expansions between 1958 and 1970. In 1974, refining operations were suspended, and the complex began a period where it was used solely as a bulk storage and distribution terminal.

In April 1985, after a lengthy retrofit, the HC-FPR Complex resumed operations processing low sulfur gas oils and residuals as feed to a Fluidized Catalytic Cracking Unit (FCCU) that converted gas oil into gasoline, fuel oil, and hydrocarbon products (e.g. methane, ethane and liquid petroleum gas). Refining operations continued from 1985 until 2013.

In December 2013, the complex was sold to Buckeye Partners, LP (Buckeye) of Breinigsville, Pennsylvania. Buckeye continues to operate the complex as a Bulk Storage and Distribution Terminal. The refinery portion of the complex has been deactivated, and with only minor exception has undergone demolition.

2.2 Aeration Basins Historical Information

Before 1974 the three existing synthetically lined Aeration Basins were used for the biological treatment of process wastewater and storm water. When the refinery was put into "standby" mode in 1974 the refinery wastewater system was modified to treat storm water runoff, the New Jersey Pollutant Discharge and Elimination System (NJPDES) permit was modified to reflect the change and the Aeration Basins were converted to be used as final polishing ponds for terminal storm water run-off. The Aeration Basins received treated storm water from the existing American Petroleum Institute (API) Oil/water separator and the corrugated plate separators, which captured free oil and petroleum hydrocarbons from the storm water stream of the terminal operations.

In 1983, HC-FPR initiated the construction of the Advanced Industrial Wastewater Treatment System (AWTS), including an API oil/water separator, corrugated plate separators, above ground equalization/surge tank, and activated sludge/clarifier system with final treatment by sand filtration and activated carbon adsorption. With the completion of the AWTS and other upgrades in 1985, the Aeration Basins were no longer needed. HC-FPR applied for a modification of NJPDES Permit NJ0028878, which included removal of the Aeration Basins. The final NJPDES permit required the submittal of an *Aeration Basin Closure Plan*. A copy of NJPDES Permit NJ0028878 is included as **Appendix I**, the approved Aeration Basin Closure Plan is included as **Appendix II**.

2.2.1 Aeration Basins Physical Setting

HC-FPR submitted an *Aeration Basin Closure Plan* to the NJDEP in February 1987. The plan proposed removal of sediment and soils that exceed specified closure criteria (100 mg/kg lead (Pb) and 200 mg/kg chromium (Cr) as reported in March 26, 1987 and July 22, 1987 NJDEP Correspondence), filling the basins with dewatered catalyst fines mixed with cement, and completing closure with a soil cap. The soil cap would be graded to a 1% slope to minimize infiltration of rainwater, and seeded with grass as erosion control. The February 1987 *Closure Plan for Aeration Basins* is included as **Appendix II**. The NJDEP approved the closure plan in letters dated March 26, 1987 and July 22, 1987, which are included as **Appendix III**.

The total surface area of the three basins was approximately 4.1 acres; this includes the surrounding dike areas. The three ponds had a combined surface water area of approximately 3.7 acres. They had an average water depth capacity of eight feet with an average above grade dike of four feet. The three basins were interconnected and were operated in series with Basin 1 receiving the separator liquid effluents. Basin 1 was the smallest of the three at approximately one third (0.3) of an acre. The effluent from this basin entered the adjoining Basin 2 to the south via gravity flow through a submerged 24 inch pipe. The second basin had an approximate surface area of 1.2 acres. The effluent from this pond entered Basin 3 to the east via gravity flow through a submerged 24 inch pipe. The east basin (Basin 3) was the largest at approximately 2.1 acres. Basin 3 effluent entered sump 1908 to be pumped to the Arthur Kill. The Site Plan for the Aeration Basins is included as **Figure 3**.

A review of available historic aerial photographs and historic topographic maps of the AOC 5 area has been conducted. The photographs (ranging in age from 1931 through 2007) and topographic maps (ranging in age from 1891 to 1981) indicate that the site was sparsely developed until 1957. The area of AOC 5 is depicted on historic aerial photographs and topographic maps as former marshlands. This assessment is further supported by NJDEP Historic Fill Quadrangles for Arthur Kill and Perth Amboy, which detail historic fill in the area of the Aeration Basins. The Aeration Basins were reportedly constructed between 1972 and 1979, and this confirmed by the historic aerial photographs. Photographs dated after 1979 indicate minimal changes to the area. Historical aerial photographs are presented in **Appendix IV**, historic topographic maps are presented in **Appendix V**, and Historic Fill Quadrangles are presented in **Appendix VI**.

2.3 Site Specific Geology and Hydrogeology

Site geology was determined using data collected during subsurface investigations conducted at the HC-FPR Complex and from the Geologic Map of the State of New Jersey. Inspection of the geologic map indicates that the HC-FPR Complex is underlain by the Magothy and Raritan formations. The Magothy Formation consists of dark lignitic sand and clay containing some glauconite near the top, and the overlying Raritan Formation consists of variable sands and clays. The western section of the HC-FPR Complex is underlain by a thick clay unit, while marsh deposits underlie the eastern and southeastern section of the HC-FPR Complex, including the

AOC 5 area.

The shallow, unconfined water table at AOC 5 was encountered between 4.03 (AB-2R) and 7.13 (AB-1) feet below ground surface (bgs) during the November 14, 2014 Site Wide Gauging Event. The average hydraulic gradient was approximately 0.01 feet per foot (ft/ft). Groundwater flow is predominately southeasterly in the northwest portion of the HC-FPR Complex and east-southeasterly in the central portion of the HC-FPR Complex. The Aeration Basin groundwater gauging data is presented in **Table 1**.

2.4 Topography

According to the United States Geological Survey *Arthur Kill Quadrangle, New Jersey / New York* 7.5 Minute Series Topographic Map, topography of the site gently slopes downward to the east from an elevation of 22 to 7 feet above mean sea level (msl). The Aeration Basins are situated approximately 10 feet above msl with the top of the dike walls at approximately 14 feet above msl. The USGS Topographic Map is presented on **Figure 1.**

2.5 Groundwater Direction

A site-wide shallow groundwater gauging event was conducted on November 14, 2014. Groundwater flow was determined to be towards the Detention Basin in the central portion of the site and to the southeast in the eastern portion of the site, consistent with previous events. Groundwater flow in the area of the Aeration Basins is towards the east/southeast. Site-wide groundwater gauging and elevation data is presented in **Table 1**. The groundwater flow map for the November 14, 2014 gauging event is presented as **Figure 4**.

3.0 Receptor Evaluation

A formal Receptor Evaluation for the entire HC-FPR Complex was submitted to the NJDEP in February 2011. The section below customizes information developed by that formal evaluation to address the conditions specific to AOC 5. The format and contents of the Receptor Evaluation below correspond to the requirements specified in the August 2012 NJDEP document *Technical Guidance for Ecological Evaluations*.

3.1 Groundwater Use

The site area is serviced by a municipal water supply, which is provided by the Middlesex Water Company. The Middlesex Water Company pulls water from the Delaware-Raritan Canal to a water treatment and pumping station located in New Brunswick, New Jersey. Well searches were conducted by The Shaw Group in December 2006 and EnviroTrac in February 2011 and December 2014. The results did not identify any potable wells within the vicinity of the Complex. The well search results have previously been submitted to the NJDEP. No domestic supply, irrigation, or industrial use wells were reported within 0.5 mile of the site during any well search.

3.2 Vapor Intrusion

The land cover in the area of AOC 5 is herbaceous vegetation (i.e. grass) with compacted gravel along the perimeter for vehicle access. Groundwater and soil sampling results in the area of the Aeration Basins indicate that all constituents of concern are below the NJDEP *Vapor Intrusion Screening Levels*. Therefore, a vapor intrusion investigation has not been triggered at this time, and no sampling is proposed.

3.3 Ecological Evaluation

An ecological evaluation (EE) was conducted at AOC 5. The EE included the identification of Environmentally Sensitive Natural Resources (ESNR) adjacent and northwest of AOC 5, in the interior of the HC-FPR Complex. Contaminants of Potential Ecological Concern (COPEC) have been identified within AOC 5.

3.3.1 Environmentally Sensitive Natural Resources

One surface water body is located 190 feet to the northwest of AOC 5. The water body is referred to as the Smith Creek Detention Basin, is identified in **Figure 4,** and is part of HC-FPR AOC 12. The Detention Basin is approximately 8.65 acres in size, and was created for the protection of downstream resources. There is no surface water outlet from the Detention Basin. Water from the basin is routinely pumped and released into the Arthur Kill under the facility's discharge permit.

Approximately 400 feet southwest of the Detention Basin and 160 feet east AOC 5 are the headwaters of Smith Creek. Smith Creek is classified as a FW2-NT/SE3 tidal channel. This is a general surface water classification applied to freshwater non-trout tributaries leading to saline estuaries.

A review of available information regarding the possible presence of environmentally sensitive natural resources (ENSRs) and New Jersey or Federally listed species found no rare, threatened, or endangered species inhabiting any portions of the site or adjacent to the subject facility. However, rare wildlife species were identified within ¼ mile of the subject site.

A review of the NJDEP Geographic Information System (GIS) digital data indicates that freshwater emergent wetlands are located around AOC 12 - Detention Basin and small patches of cord grass (*Spartina Alterniflora*) were identified surrounding the Detention Basin. To the south of the Detention basin are freshwater emergent (0.14 miles) and riverine (0.16 miles) wetlands. No wetlands were identified within the boundaries of AOC 5.

A NJDEP *Freshwater Wetlands Letter of Interpretation-Line Verification* (File No. 1225-03-0016.4 (FWW 110001)), dated February 28, 2012, recognizes additional wetland areas 50 feet southeast and 95 feet northeast of AOC 5. These wetlands are of Intermediate Resource Value, and are part of the Raritan Bay estuary wetlands. The NJDEP correspondence dated February 28, 2012, and associated attachments, have been included as **Appendix VII.**

The Detention Basin and the surrounding freshwater emergent wetlands, and the wetlands described in the February 28, 2012 NJDEP correspondence, are considered environmentally sensitive areas.

During the onsite field investigation of AOC 5, there were no visual observations of existing contaminant migration pathways such as stressed or dead vegetation, discolored soil, absence of biota from particular areas, or seeps and discharges. Herbaceous vegetation (grass) covers most of AOC 5.

3.3.2 Contaminants of Potential Ecological Concern

For purposes of this evaluation, the highest concentrations detected from any groundwater or soil sample from the Aeration Basin Area was compared, when available, to the NJDEP Ecological Screening Criteria (ESC) pursuant to N.J.A.C. 7:9 B. Analytical data indicates that select metals (arsenic, lead, and vanadium) and semi-volatile compounds (Di-n-butyl phthalate and bis(2-ethylhexyl)phthalate) are present in the site groundwater. Chromium is present in AOC 5 soil at levels above applicable ESC. These compounds will therefore be considered Contaminants of Potential Ecological Concern (COPECs).

Table 2 is a comparison of the most elevated compound concentration in soil samples collected within AOC 5 and dissolved groundwater collected during the November 2014 sampling event to the applicable ESC.

3.3.3 Contaminant Migration Pathways

Soil investigations have identified the COPECs chromium and lead in soil samples collected in 1987 and 1988, and chromium in 2013. The most recent groundwater sampling event (November 14, 2014) has reported analytical results of arsenic, lead, vanadium, bis(2ethyl-hexyl)phthalate and di-n-butyl phthalate at concentrations greater than the NJDEP ESC in monitoring well AB-1. This well is located downgradient of AOC 5 and upgradient of wetlands located to the southeast.

The groundwater flow through AOC 5 has consistently been southeast as illustrated on **Figure 4**. Wetlands identified in the NJDEP *Freshwater Wetlands Letter of Interpretation-Line Verification* (File No. 1225-03-0016.4 (FWW 110001)), are located 50 to 95 feet downgradient. The identified wetland areas and the Aeration Basins are separated by a compacted gravel roadway and no preferential pathways have been identified in the area, however COPECs identified at upgradient AOC 5 could potentially impact the identified wetlands areas.

3.3.4 Conclusion of Ecological Evaluation

The EE finds that a potential migratory pathway may exist between AOC 5 to an ENSR (wetlands), and that COPECs with concentrations above the NJDEP ESC have been identified. Thus, pursuant to N.J.A.C 7:26E-4.8, a Remedial Investigation of Ecological Receptors that includes the delineation of the horizontal and vertical extent of the contaminant concentrations in the migration pathway, and an ecological risk assessment for each constituent of ecological concern, are required at this time.

4.0 Aeration Basin Closure Activities

4.1 Detritus Characterization and Removal

During the period when the Aeration Basins served as biological treatment units, and as final 'polishing' ponds for terminal storm water run-off, suspended particles of the wastewater stream settled and accumulated on the synthetic liners of each basin, resulting in a layer of detritus. The NJPDES permit # NJ0028878 required that prior to the removal of each basin synthetic liner, this overlying detritus material be characterized, removed, and deposited into the facility's No. 1 Landfarm.

The following characterization chronology has been extracted from the historical sections of the *Closure Plan for Aeration Basins* - February 1987 (**Appendix II**), the Aeration Basins Sediment Characterization Plan (**Appendix VIII**), and the *Status Report for Closure of the Aeration Basins* - June 1988 (**Appendix IX**).

Initial characterization of Basin 3 detritus occurred on February 10, 1983. The sample was analyzed for Extraction Procedure (EP) Toxicity, lead, and chromium in accordance with Appendix II of 40 CFR 261, to determine if the detritus would be regulated as Resource Conservation and Recovery Act (RCRA) waste.

On November 3, 1983, Basin 1 and Basin 3 detritus was also analyzed for EP Toxicity, oil and grease, petroleum hydrocarbons, pH, total lead, and chromium. Based on the results of the toxicity tests, the basin sediments of both basins were found to be non-hazardous; however, the chromium results of Basin 1 reported a concentration of 521 milligrams/kilograms (mg/kg). Basin 1 is expected to contain the highest concentrations of waste constituents due to it being the first of the three in a series, and was tested again on April 25, 1985 for oil and grease, petroleum hydrocarbons, pH, total lead, and chromium. The chromium results reported a concentration of 541 mg/kg. The analytical results for the February 1983, November 1983, and April 1985 sampling events are presented in Attachment No. 2 of the *Closure Plan for Aeration Basins,* included as **Appendix II.**

Detritus samples were collected from the Aeration Basins in September 1986 and 1990 and submitted for analysis of Toxicity Characteristic Leachate Procedure (TCLP), Volatile Organic Compounds (VOCs), Semi-volatile Organic Compounds (SVOCs), Pesticides/Herbicides, and Metals. Chloroform and barium were detected in the 1986 sample at the respective concentrations of 0.228 and 0.270 milligrams per liter (mg/l). These values were well below the applicable TCLP regulatory thresholds of 6.0 mg/l and 100 mg/l, respectively. Benzene and chromium were detected in the sediment sample collected in 1990 at the respective concentrations of 0.0126 mg/l and 0.670 mg/l. These constituents were detected well below the applicable respective regulatory thresholds of 0.5 mg/l for benzene and 5.0 mg/l for chromium. The analytical results may be found in Appendix 1 of the *Aeration Basins Sediment Characterization Plan* included in **Appendix VIII.**

Subsequent to the characterization sampling, the process of detritus removal began in Basin 3. By 2001, approximately 1,000 cubic yards of detritus had been moved to the HC-FPR No. 1 Landfarm. Further details are available on page 4 of the *Status Report for the Closure of the Aeration Basins* which is included as **Appendix IX.**

As the No. 1 Landfarm reached capacity, detritus began to be stockpiled at the north side of Basin 2. By 2010, approximately 8,000 cubic yards of detritus had been piled and stored under synthetic liner at the north side of Basin 2. On April 25, 2011, this material was sampled for waste characterization in accordance with NJDEP requirements, and submitted to Accutest Laboratories (Accutest) of Dayton New Jersey (New Jersey Certified Laboratory 12129) for analysis. Forty-four (44) soil samples were collected and analyzed for Total Petroleum Hydrocarbons (TPH), and six samples were collected and analyzed for VOCs, SVOCs, Priority Pollutant (PP) Metals, Polychlorinated Biphenyls (PCBs), paint filter, and TCLP metals. From July 5 to August 4, 2011, a total of 9,266 tons of detritus were removed and disposed of by Bayshore Soil Management, LLC of Keasby, New Jersey. The analytical data and disposal documentation are included as **Appendix X** and **Appendix XI**, respectively

4.2 Aeration Basin Dewatering

In the HC-FPR Closure Plan Approval Letter dated March 26, 1987, the NJDEP required that HC-FPR remove the standing water from each of the three basins as soon as practical so that soil samples may be collected. The approved 1987 *Closure Plan for Aeration Basins* included as item one of the closure strategy, that all remaining water will be discharged to the refinery wastewater treatment system and that this task will be ongoing throughout the closure project. In accordance with the Closure Plan, HC-FPR proposed an underdrain system to the NJDEP. In January 1988, the NJDEP requested modifications to the proposed underdrain system.

In a letter dated February 16, 1988 from Hess to NJDEP, HC-FPR proposed to install an upgraded underdrain system which was designed to connect the three basins and collect and transport groundwater to the Advanced Wastewater Treatment System (AWTS) for final treatment and disposal. The modified system was approved in NJDEP correspondence dated February 24, 1988, and is attached as **Appendix XII**. The underdrain system consists of perforated piping and wet wells connected to a transfer pump that moves collected storm water and groundwater to the AWTS. The underdrain system was constructed in stages with the infilling of each basin. Completion occurred in July 2014 and is currently inactive due to the completion of infilling. The drainage system is illustrated on **Figure 5.**

5.0 Delineation Soil and Groundwater Investigation Activities

5.1 Soil Sampling Activities

Due to elevated concentrations of chromium, lead, and oil and grease found in the detritus sampling completed in 1983 and 1985 (See Section 4.1), HC-FPR proposed sub-liner soil sampling for lead, chromium, and oil and grease. On April 3, 1987, a total of ten samples were collected from the 0.0 to 0.5 foot interval in the three Basins. Four of ten results reported elevated chromium concentrations (in excess of 100 mg/kg). The analytical results and soil sample locations may be found in HC-FPR correspondence dated May 28, 1987 and is included as **Appendix XIII**.

In correspondence dated July 22, 1987, the NJDEP required that HC-FPR to: 1) remove soil surrounding two sample locations exhibiting elevated levels of chromium (in excess of 200 mg/kg), and 2) to delineate the extent of soils exhibiting chromium concentrations over 200 mg/kg. The NJDEP correspondence is included in **Appendix III**.

HC-FPR re-sampled the subsoil of Basin 3 on January 15, 1988. A total of six grab samples were collected, approximately 150 feet apart. One of the soil samples indicated that total chromium was detected above 200 mg/kg (dry weight). Eight additional soil samples were then collected around the elevated sample location to determine the actual size of the area requiring removal. HC-FPR removed approximately 6 cubic yards of soil containing chromium in excess of 200 mg/kg and deposited it to the No. 1 Landfarm in the spring of 1988. Please see page 3, and sketch 4 and 5 of *Chapter 6 – Aeration Basins of the Hess Comprehensive Management Plan for the Resource Conservation and Recovery Act dated December 3, 2001* included as **Appendix XIV**.

In preparation for the closure of Basin 1 and 2, a grab sample was collected from each basin in the 0.0 to 0.5 foot interval on November 1, 2013, as requested in the July 22, 1987 NJDEP Correspondence (**Appendix III**), and were submitted to Accutest for analysis. Analysis was conducted for Extractable Petroleum Hydrocarbons (EPH), chromium, and hexavalent chromium (via method SW846 6010C). Both samples were below the 5,100 mg/kg Residential EPH soil remediation standard; chromium results were reported as 28.9 mg/kg (NW-2) and 161 mg/kg (SW-2), below the NJDEP approved 200 mg/kg Closure Objective. Analytical results for hexavalent chromium are not available, due to the very high reducing conditions of soil samples. The sample environment was found to reduce hexavalent chromium to trivalent chromium. Although a quantitative concentration cannot be established, the results are fully compliant with United States Environmental Protection Agency (USEPA) method SW 846 6010C. The established concentration of hexavalent chromium under the sample conditions is 0.0 mg/kg. The analytical results are presented in **Table 3** and the locations shown on **Figure 6**. The analytical report and laboratory determination of highly reducing conditions are included as **Appendix XV**.

5.2 Well Installation and Groundwater Sampling Activities

Five (5) groundwater monitoring wells (AB-1 through AB-5) were installed around the Aeration Basins during April 2002 at the locations illustrated on **Figure 3**. These wells were installed to provide a suitable network of groundwater monitoring points for determining groundwater flow and quality in the vicinity of the Aeration Basins. The groundwater flow consistently has been southeast as shown on **Figure 4**.

Groundwater samples for monitoring wells AB-1 through AB-5 were collected during May 2002 as a baseline groundwater sampling event to assess the impact of the Aeration Basins and the potential for movement of any constituents. The analytical results of this groundwater sampling event were presented in the *Baseline Groundwater Investigation Report*, submitted on August 29, 2003.

Monitoring well AB-2 was replaced with AB-2R on October 6, 2008. AB-4R replaced damaged AB-4 on June 23, 2014. AB-4D was installed on July 19, 2013 as part of site-wide monitoring of deeper conditions onsite.

Aeration Basin monitoring wells are sampled annually as part of the site-wide groundwater sampling event. The analytical results are presented in Quarterly Progress Reports. The Aeration Basin wells were sampled on November 14, 2014 for VOCs, SVOCs and metals. Analytical results reported all targeted VOC and SVOC compound concentrations as either ND or below the NJDEP GWQS.

Inorganic parameter analytical results of aluminum, arsenic, iron, lead, manganese, and sodium are consistently greater than the NJDEP GWQS. However, these metals are routinely detected above standards in other site wells, and are associated with background conditions. Available well records are included as **Appendix XVI**. Summarized groundwater analytical results are prsented in **Table 4**.

6.0 Aeration Basin Infilling

The main component of the closure strategy is the infilling of the former Aeration Basins with clean material. In December of 1985, representatives of HC-FPR met with representatives of the NJDEP's Division of Waste Management regarding the use of Fluid Catalytic Cracking Unit (FCCU) catalyst fines (cat fines) as fill material. Further details are available on page 5 of the *Closure Plan for Aeration Basins* (**Appendix II**).

"Cat fines" originate as a natural clay introduced into the FCCU and are used to convert, or "crack", crude oil into gasoline and by-products. The clay acts as a catalyst by promoting the conversion without taking part in the reaction. As the clay particles are worn down in a high temperature fluid bed reactor under turbulent conditions, the clay is changed into inert, non-hazardous "fines" and collected in a clarifier system. HC-FPR proposed mixing these "cat fines" with cement and using this mixture as fill to close the Aeration Basins. The NJDEP approved the use of "catalyst clays" to infill the basins in correspondence dated February 24, 1988, which is included as **Appendix XII.**

An initial estimate of the material volume needed to completely infill the basins was 30,000 cubic yards is contained on page 6 of the *Closure Plan for Aeration Basins* included as **Appendix II.** A review of the historic aerials reveals that by 2004 Basin 3 was near capacity with cat fines. Historical aerial photographs are presented as **Appendix IV.**

With the discontinuation of operation at the HC-FPR Complex, sufficient volume of cat fines was not available to completed the infilling of Basins 1 and 2. Fill material was sourced from outside entities and from June 24 to July 2, 2014, a total of 2,734.55 tons of 1.5 inch stone (1,709 cubic yards) and 4,453.61 tons of quarry process (2,783 cubic yards) from Stavola Company of Red Bank, New Jersey were introduced into Basin 1 and Basin 2. All three Basins were completed with a soil cap, graded to 1% slope. In October 2014 the soil cap was seeded with grass. The quarry manifests are included as **Appendix XVII- Fill Documentation.** A drawing of the capped Aeration Basins is included as **Figure 7.**

7.0 Conclusions and Summary

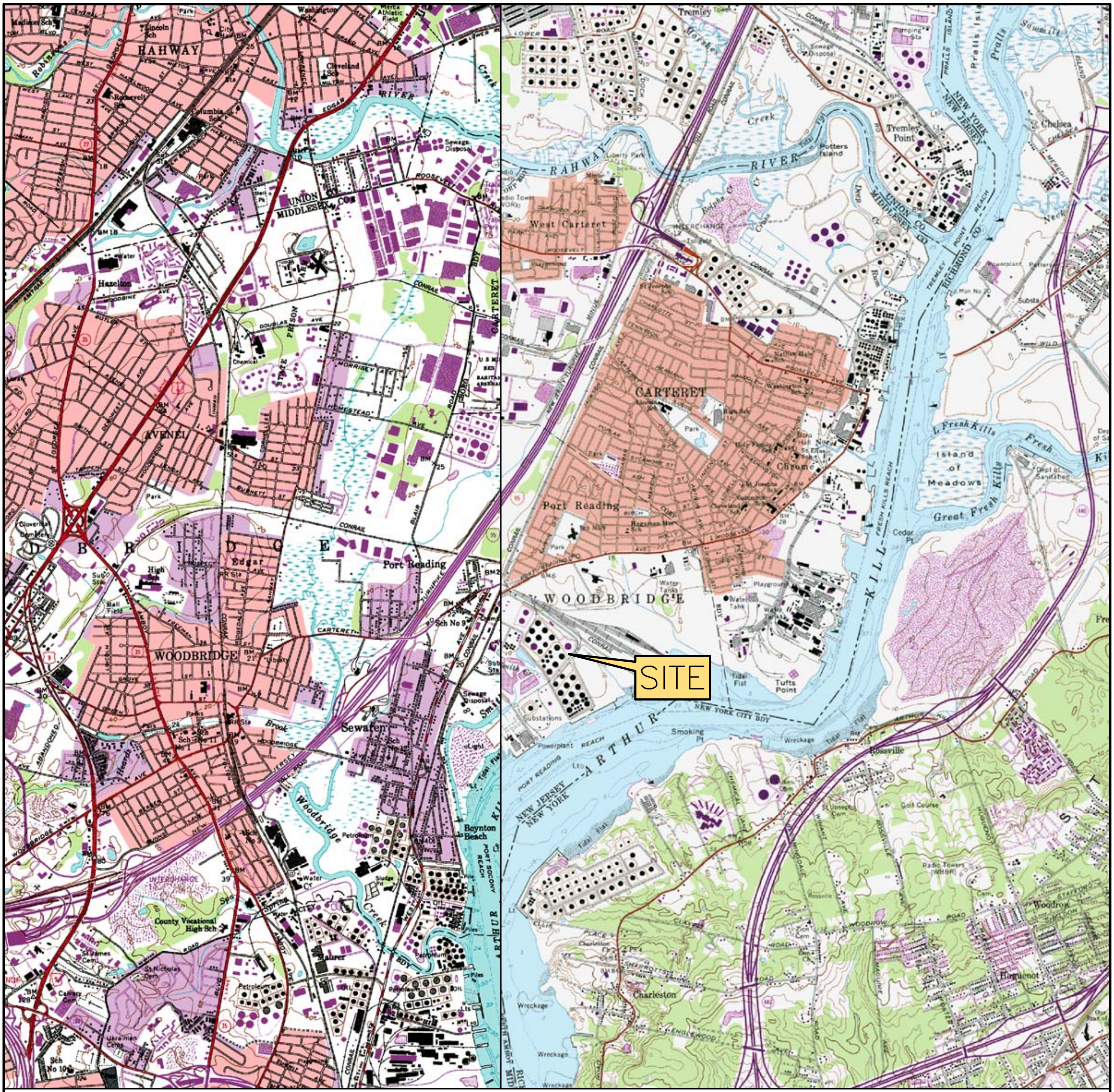
The closure strategy of the February 1987 *Closure Plan for Aeration Basins* involved four concepts: 1) characterize and remove basin detritus to the No. 1 Landfarm; 2) dewater the basins over the period of closure; 3) delineate and remove sub-liner contaminated soil to the No. 1 Landfarm; and 4) infill the basins with the inert, non-hazardous cat fines/cement composition. This strategy was approved by the NJDEP in correspondence dated March 26, 1987, which is included as **Appendix III**.

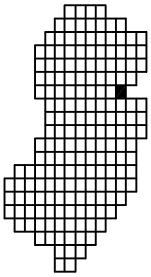
Since 1987, HC-FPR has used the approved closure plan as a blueprint for all Basin closure efforts. All Basin detritus has been characterized and removed to the No. 1 Landfarm or an offsite, registered disposal facility. The soil underlying the synthetic liner in each Basin has been characterized by methods approved by the NJDEP, and removed to the No. 1 Landfarm if elevated levels of contaminants were discovered. All three basins have been completely infilled with the inert cat fines/cement composition and quarry process, capped with topsoil, and seeded with grass.

Groundwater monitoring through annual sampling events of the Aeration Basin monitoring wells has indicated that concentrations of all VOCs and SVOCs are below the NJDEP GWQS in the shallow wells. Low level VOCs have been in temporary wells upgradient from the former Aeration Basin at approximately 8 feet bgs. This indicates that the VOCs do not originate from the Basins. Concentrations of inorganic elements such as aluminum, arsenic, lead, iron, manganese, and sodium are consistently greater than the NJDEP GWQS; however, these concentrations are found above the NJDEP GWQS throughout the site and are not attributable to AOC 5.

The Aeration Basins have been capped per the 1987 Approved Closure Plan. As required in the July 22, 1987 NJDEP Correspondence, HC-FPR is required to place a Deed Notice on the former Aeration Basins. The proposed Soil Remedial Action Permit (SRAP), including Deed Notice is included as **Appendix XVIII** and includes post closure care of capping as part of the closure plan.

FIGURES



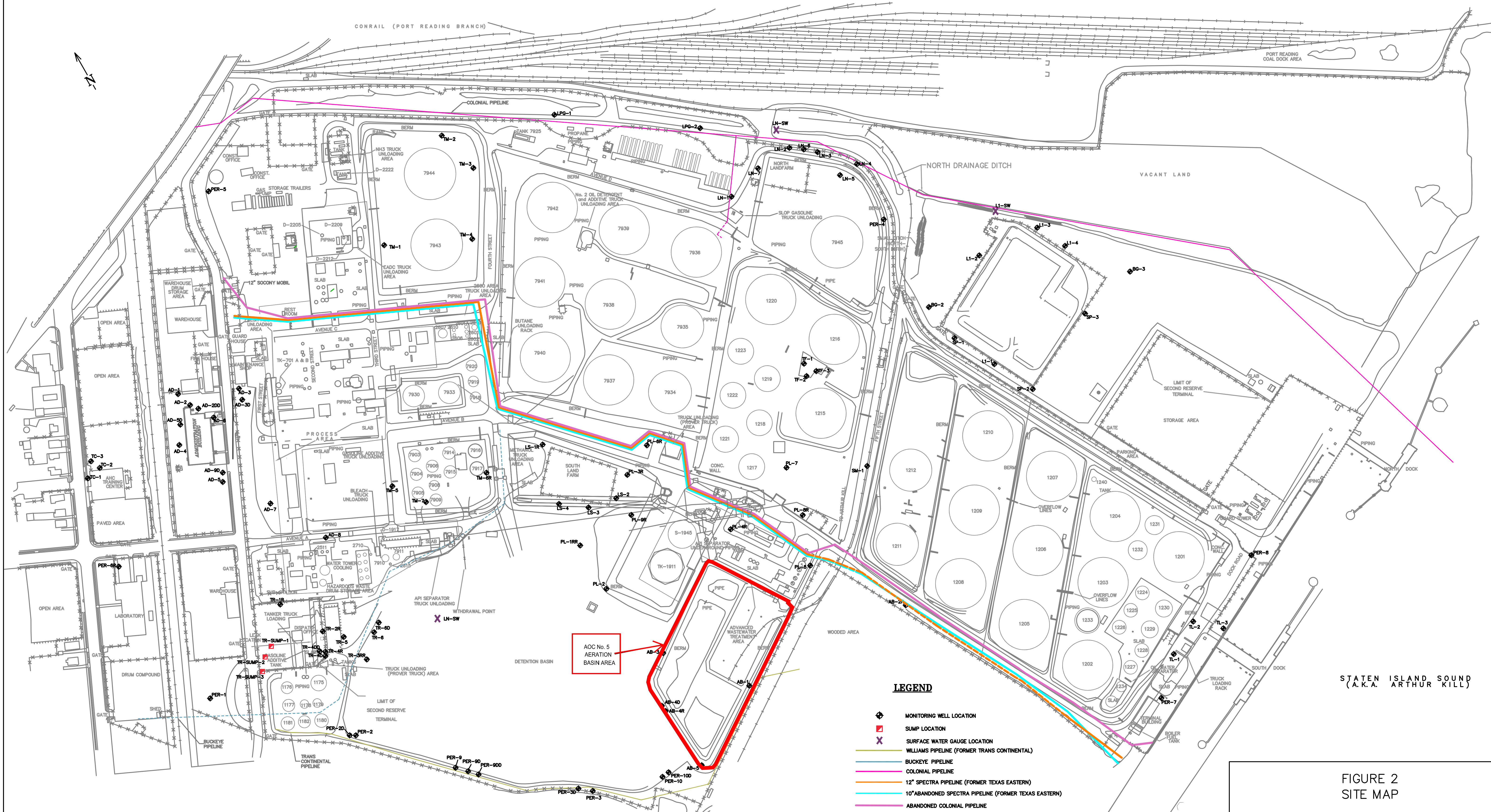


QUADRANGLE LOCATION:
ARTHUR KILL NEW JERSEY/NEW YORK

0 2,000 4,000 8,000 12,000 FEET

N S E W

FIGURE #		DRAWN BY: KN	
1	U.S.G.S TOPOGRAPHIC MAP HESS CORPORATION FORMER HESS PORT READING FACILITY 750 CLIFF ROAD PORT READING, NEW JERSEY	REVISION DATE: 3/31/2014	EnviroTrac ENVIRONMENTAL SERVICES 6 TERRI LANE, SUITE #350, BURLINGTON, NJ 08016 PHONE: (609)387-5553 FAX: (609)387-5533



NOTES:

1. AOC – AREA OF CONCERN
2. SWMU – SOLID WASTE MANAGEMENT UNIT
3. UST – UNDERGROUND STORAGE TANK
4. AST – ABOVE GROUND STORAGE TANK
5. AOC BORDERS WILL MODIFY IN ACCORDANCE WITH FIELD INVESTIGATION RESULTS
6. AOCs 97 ABOVE GROUND PIPING RUNS
7. AOCs 98 STORM&PROCESS SEWERS ARE NOT DEPICTED ON THIS FIGURE

FIGURE 2
SITE MAP

HESS CORPORATION
FORMER HESS PORT READING COMPLEX
750 CLIFF ROAD
PORT READING, NEW JERSEY

DRAWN BY: CM
DATE: 12/29/2014

0 150
SCALE IN FEET

EnviroTrac
ENVIRONMENTAL SERVICES
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PHONE: (609)387-5553 FAX: (609)387-5533

FIGURE #
3

HESS CORPORATION
FORMER HESS PORT READING COMPLEX
750 CLIFF ROAD
PORT READING, NEW JERSEY

HESS

SITE MAP AOC 5 – AERATION BASIN

DRAWN BY: CM

REVISION DATE: 3/23/15

0 100
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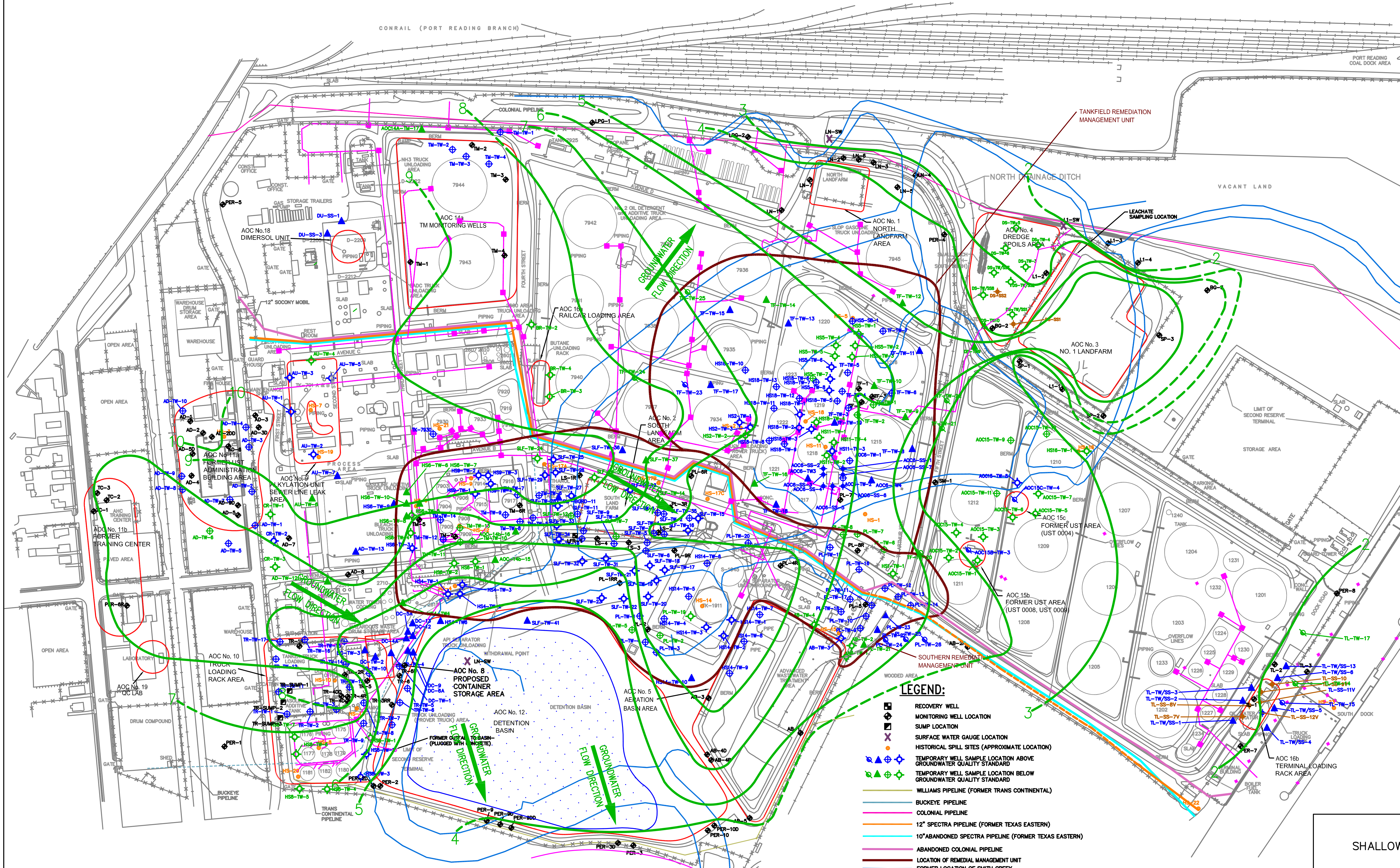

LEGEND:

- RECOVERY WELL
- MONITORING WELL LOCATION
- SUMP LOCATION
- SURFACE WATER GAUGE LOCATION
- HISTORICAL SPILL SITES (APPROXIMATE LOCATION)
- TEMPORARY WELL SAMPLE LOCATION ABOVE GROUNDWATER QUALITY STANDARD
- TEMPORARY WELL SAMPLE LOCATION BELOW GROUNDWATER QUALITY STANDARD
- WILLIAMS PIPELINE (FORMER TRANS CONTINENTAL)
- BUCKEYE PIPELINE
- COLONIAL PIPELINE
- 12" SPECTRA PIPELINE (FORMER TEXAS EASTERN)
- 10"ABANDONED SPECTRA PIPELINE (FORMER TEXAS EASTERN)
- ABANDONED COLONIAL PIPELINE
- LOCATION OF REMEDIAL MANAGEMENT UNIT
- FORMER LOCATION OF SMITH CREEK
- RAILROAD
- SURFACE WATER (Approximate)
- LOCATION OF KNOWN AOC
- PROCESS/STORM SEWER LINE

NOTES:

1. AOC – AREA OF CONCERN
2. SWMU – SOLID WASTE MANAGEMENT UNIT
3. UST – UNDERGROUND STORAGE TANK
4. AST – ABOVE GROUND STORAGE TANK
5. AOC BORDERS WILL MODIFY IN ACCORDANCE WITH FIELD INVESTIGATION RESULTS
6. AOCs 97 ABOVE GROUND PIPING RUNS
7. AOCs 98 STORM&PROCESS SEWERS ARE NOT DEPICTED ON THIS FIGURE

MONITORING POINT	DEPTH TO BOTTOM	KNOWN ELEVATION	DEPTH TO WATER	DEPTH TO PRODUCT	GROUNDWATER ELEVATION
DB–SW	–	1.08	3.50	–	4.58
AB–1	12.35	11.68	7.13	–	4.55
AB–2R	20.81	8.53	4.03	–	4.50
AB–3	13.23	12.33	4.69	–	7.64
AB–4R	15.45	12.05	5.34	–	6.71
AB–5	13.20	11.18	6.87	–	4.31
AD–1	11.00	16.12	NM	NM	NM
AD–2	16.95	16.64	6.32	–	10.32
AD–3	14.00	19.96	10.57	–	9.39
AD–4	14.37	15.45	7.63	–	7.82
AD–5	14.56	15.59	6.67	–	8.92
AD–6	14.55	17.13	7.65	–	9.48
AD–7	NM	NM	NM	NM	NM
AD–8	14.85	15.85	7.34	–	8.51
BG–2	10.85	9.02	5.09	–	3.93
BG–3	10.84	10.31	5.44	–	4.87
L1–1	15.03	11.29	7.58	–	3.71
L1–2	14.39	9.05	7.03	–	2.02
L1–3	11.05	9.33	7.52	–	1.81
L1–4	NM	10.85	9.01	–	1.84
L1–SW	–	–0.20	2.70	–	2.50
LN–1	NM	10.52	4.98	–	5.54
LN–2	NM	9.88	5.89	–	3.99
LN–3	NM	9.16	5.38	–	3.78
LN–4	NM	10.92	7.37	–	3.55
LN–5	16.28	10.70	6.95	–	3.75
LN–6	NM	12.40	8.52	–	3.88
LN–7	NM	13.56	9.08	–	4.48
LN–SW	–	–0.31	2.80	–	2.49
LPG–1	8.17	11.60	5.90	–	5.70
LPG–2	9.76	7.05	3.25	–	3.80
LS–1R	16.90	12.25	2.78	–	9.47
LS–2	12.16	9.75	3.37	–	6.38
LS–3	12.82	8.40	1.19	–	7.21
LS–4	14.46	9.28	2.10	–	7.18
PER–1	17.70	17.18	10.78	–	6.40
PER–2	12.23	10.76	6.67	–	4.09
PER–3	12.32	7.32	4.84	–	2.48
PER–4	15.56	10.54	6.52	–	4.02
PER–5	NM	NM	NM	NM	NM
PER–6R	21.85	21.54	12.56	–	8.98
PER–7	16.24	8.94	6.89	–	2.05
PER–8	14.61	7.74	6.00	–	1.74
PER–9	17.85	8.02	4.24	–	3.78
PER–10	15.71	12.19	8.69	–	3.50
PL–1RR	14.87	7.36	2.26	–	5.10
PL–2	–	9.58	2.37	2.35	7.22
PL–3R	18.83	10.16	2.85	–	7.31
PL–4R	20.08	10.61	3.44	–	7.17
PL–5	NM	NM	NM	NM	NM
PL–6R	21.66	9.34	2.42	–	6.92
PL–7	19.60	10.75	4.27	–	6.48
PL–8R	21.85	9.91	3.92	–	5.99
PL–9R	20.78	9.11	1.94	–	7.17
SM–1	14.16	8.59	4.81	–	3.78
SP–1	12.07	9.26	6.35	–	2.91
SP–2	12.40	10.77	6.25	–	4.52
SP–3	13.05	9.33	4.30	–	5.03
TC–1	17.65	18.04	9.94	–	8.10
TC–2	14.01	17.29	9.80	–	7.49
TC–3	17.34	17.01	9.57	–	7.44
TF–1	12.21	8.60	1.92	–	6.68
TF–2	–	7.69	2.89	–	5.57
TF–3	11.88	8.58	2.00	–	6.58
TL–1	12.82	8.81	6.77	–	2.04
TL–2	14.45	8.48	6.54	1.86	1.94
TL–3	10.00	8.68	6.93	–	1.75
TM–1	21.13	20.06	10.82	–	9.24
TM–2	12.50	20.14	11.55	–	8.59
TM–3	20.98	20.19	11.59	–	8.60
TM–4	15.07	19.01	10.12	–	8.89
TM–5	22.24	16.13	8.68	–	7.45
TM–6R	20.05	14.26	5.40	–	8.86
TM–7	21.56	14.81	7.56	–	7.25
TR–1R	15.15	13.68	7.19	–	6.49
TR–2R	–	12.47	5.40	5.29	7.15
TR–3RR	14.66	9.63	4.54	–	5.09
TR–4R	14.41	12.18	4.11	–	8.07
TR–5	10.65	11.99	5.61	–	6.38
TR–6	12.58	10.78	5.70	–	5.08

Figure 4

SHALLOW GROUNDWATER CONTOUR MAP
NOVEMBER 13, 2014

HESS CORPORATION
FORMER HESS PORT READING COMPLEX
750 CLIFF ROAD
PORT READING, NEW JERSEY

DRAWN BY: KN
DATE: 1/29/2015

0 150
SCALE IN FEET

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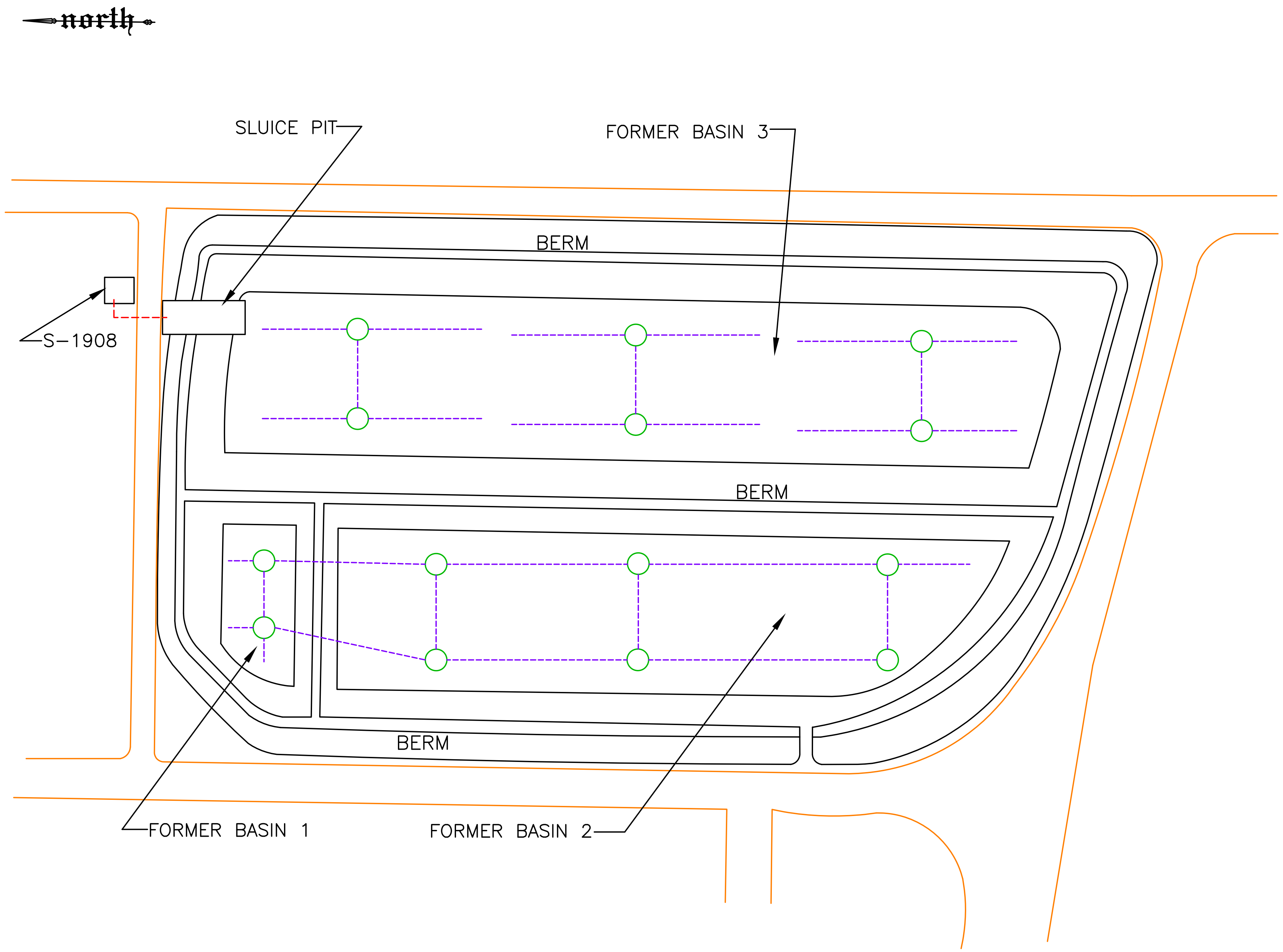
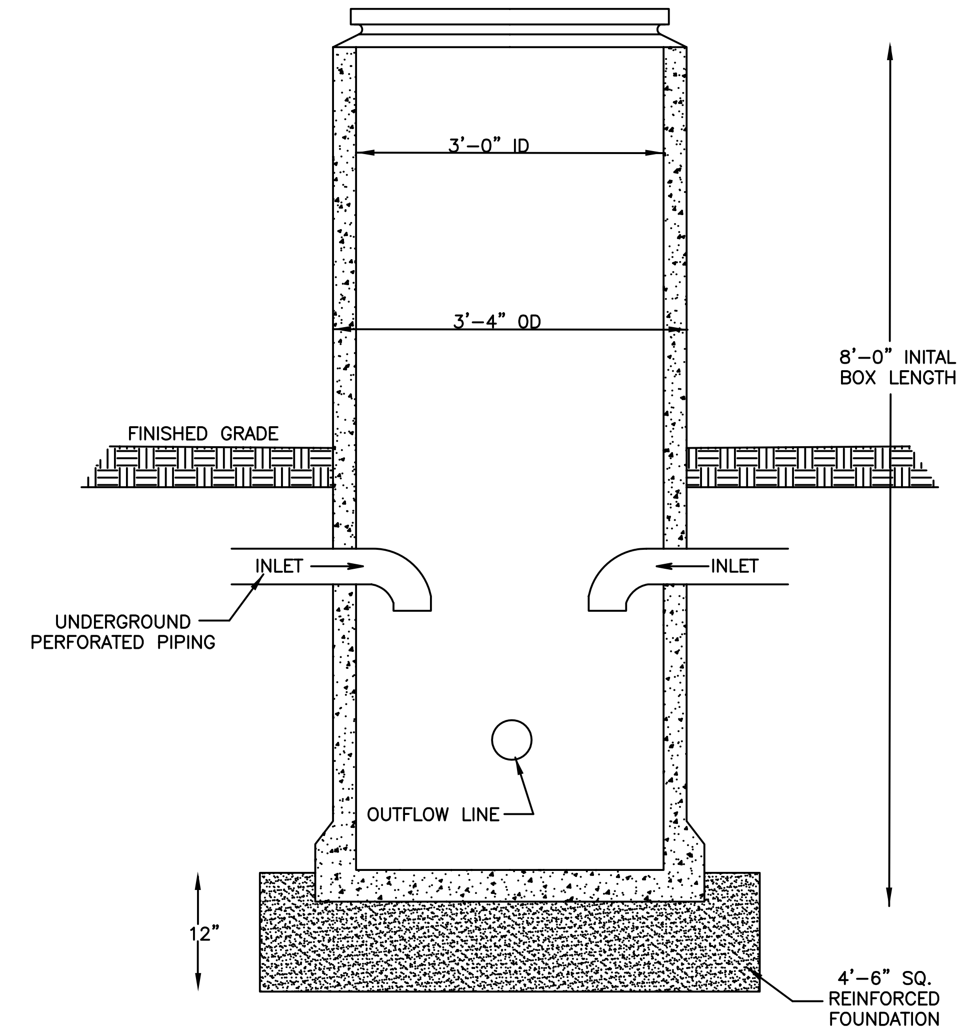


PLAN VIEW

LEGEND:

- ASSUMED UNDERGROUND PIPING
- ACCESS ROADWAY
- WET WELL LOCATION
- UNDERGROUND PERFORATED PIPING



TYPICAL WET WELL DETAIL

FIGURE # 5	FORMER HESS PORT READING COMPLEX 750 CLIFF ROAD PORT READING, NEW JERSEY	AERATION BASIN DRAINAGE SYSTEM DRAWN BY: KN — REVISION DATE: 3/6/2015	NOT TO SCALE	EnviroTrac ENVIRONMENTAL SERVICES 6 TERRI LANE, SUITE #350, BURLINGTON, NJ 08016 PHONE: (609)387-5553 FAX: (609)387-5533

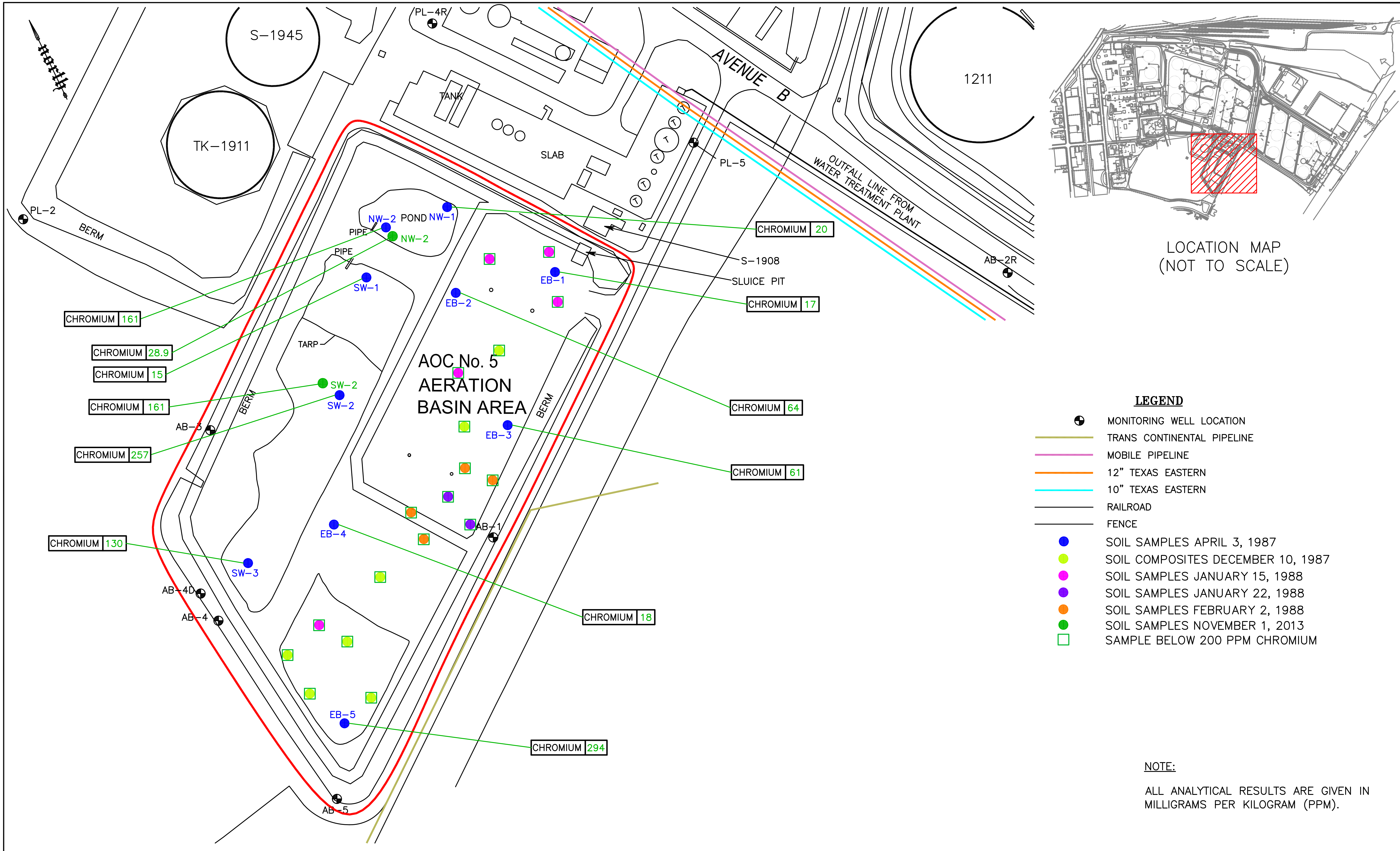


FIGURE # 6

HESS CORPORATION
FORMER HESS PORT READING COMPLEX
750 CLIFF ROAD
PORT READING, NEW JERSEY

HESS

AOC 5 – AERATION BASINS
HISTORICAL SOIL SAMPLE LOCATION MAP

DRAWN BY: KN

REVISION DATE: 3/6/15

0 100
SCALE IN FEET

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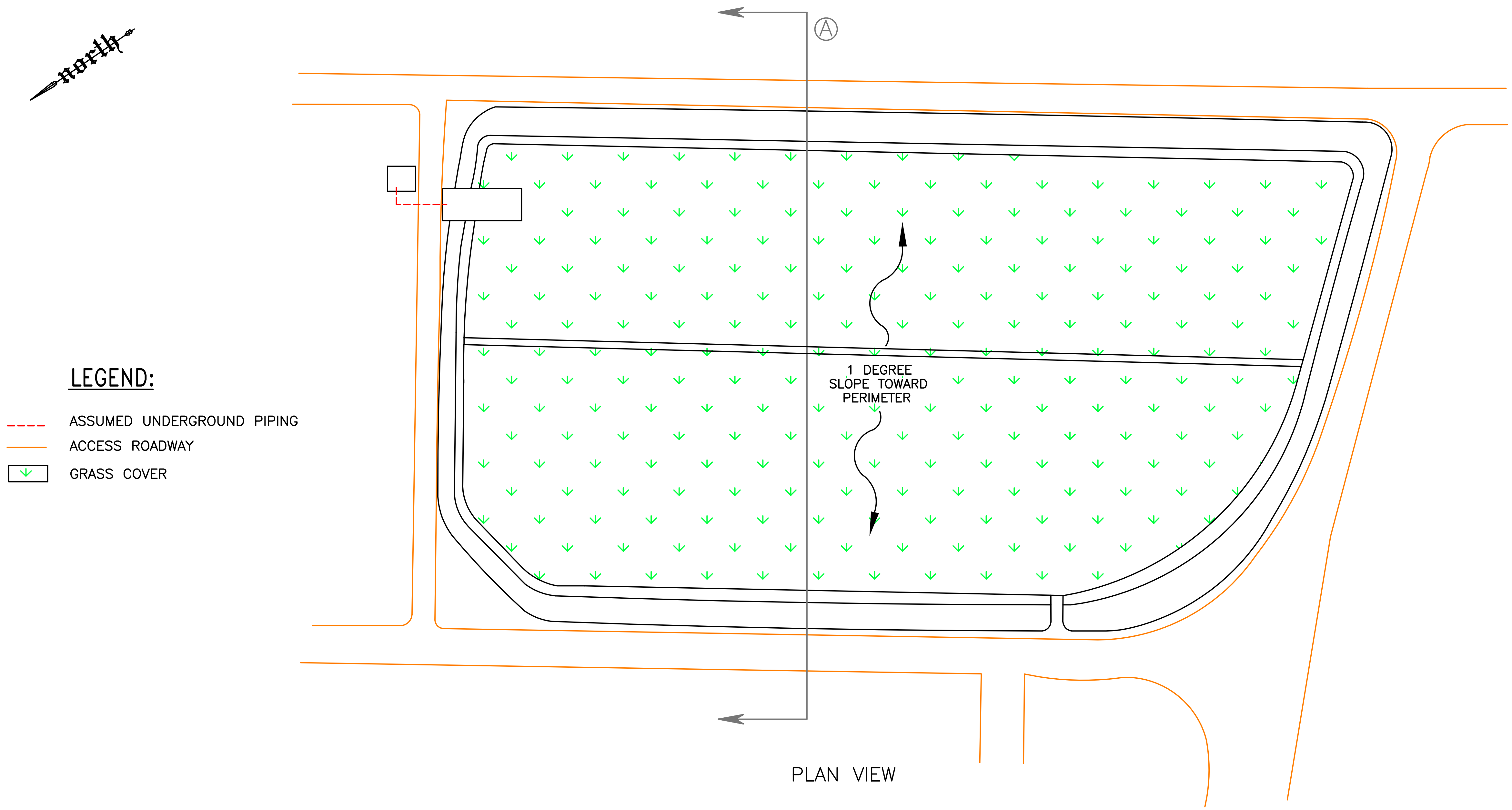
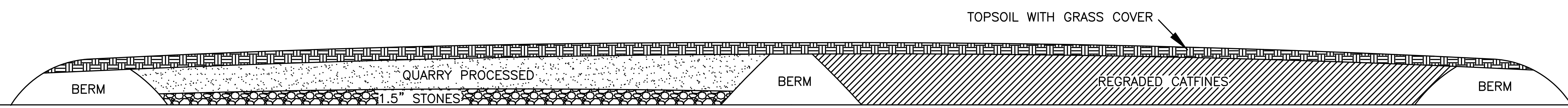


PLAN VIEW



SECTION A

FIGURE # 7	FORMER HESS PORT READING COMPLEX 750 CLIFF ROAD PORT READING, NEW JERSEY	AERATION BASIN PLOT PLAN DRAWN BY: KN — REVISION DATE: 12/10/2014	NOT TO SCALE	EnviroTrac ENVIRONMENTAL SERVICES 6 TERRI LANE, SUITE #350, BURLINGTON, NJ 08016 PHONE: (609)387-5553 FAX: (609)387-5533

TABLES

1. Site Wide Groundwater Gauging Summary Table

2. Aeration Basin Ecological Comparison Table

3. Soil Sampling Analytical Data Package- November 1, 2013

4. Aeration Basin Groundwater Analytical Summary Data Table

Table 1
Site-Wide Groundwater Gauging Data
Hess Corporation- Former Port Reading Complex
750 Cliff Road
Port Reading, Middlesex County, New Jersey

Well	Date	DTB (ft)	TOC (ft)	DTW (ft)	DTP (ft)	GW Elevation (ft)
AB-1	7/7/2008	13.02	13.85	6.33	--	7.52
	7/10/2009	13.02	13.85	5.93	--	7.92
	9/8/2010	--	13.85	5.68	--	8.17
	8/25/2011	12.91	13.85	5.01	--	8.84
	6/26/2012	14.15	13.85	4.60	--	9.25
	11/26/2012	13.11	13.85	5.42	--	8.43
	7/22/2013	14.20	13.85	4.72	--	9.13
	11/11/2013	13.10	13.85	8.65	--	5.20
AB-2	7/7/2008	14.64	12.03	2.88	--	9.15
AB-2R	12/5/2008	21.25	10.81	4.48	--	6.33
	7/10/2009	21.25	10.81	4.22	--	6.59
	9/8/2010	--	10.81	4.04	--	6.77
	8/25/2011	21.01	10.81	3.95	--	6.86
	6/26/2012	21.05	10.81	3.90	--	6.91
	11/26/2012	21.03	10.81	4.35	--	6.46
	7/22/2013	21.02	10.81	4.17	--	6.64
	11/11/2013	21.05	10.81	8.06	--	2.75
AB-3	7/7/2008	13.08	14.62	7.09	--	7.53
	7/10/2009	13.08	14.62	4.15	--	10.47
	9/8/2010	--	14.62	5.77	--	8.85
	8/25/2011	13.09	14.62	6.51	--	8.11
	6/26/2012	13.15	14.62	3.63	--	10.99
	11/26/2012	13.13	14.62	3.10	--	11.52
	7/22/2013	13.09	14.62	3.97	--	10.65
	11/11/2013	13.10	14.62	7.27	--	7.35
AB-4	7/7/2008	6.58	14.24	5.13	--	9.11
	7/10/2009	6.58	14.24	4.09	--	10.15
	9/8/2010	--	14.24	DRY	--	--
	8/25/2011	4.90	14.24	4.60	--	9.64
	6/26/2012	4.85	14.24	3.03	--	11.21
	11/26/2012	4.90	14.24	3.42	--	10.82
	7/22/2013	4.95	14.24	3.75	--	10.49
	11/11/2013	4.89	14.24	DRY	--	--
AB-4D	7/22/2013	32.66	11.80	9.99	--	1.81
	12/4/2013	32.55	11.80	9.72	--	2.08
AB-5	7/7/2008	13.09	13.24	5.61	--	7.63
	7/10/2009	13.09	13.24	4.97	--	8.27
	9/8/2010	--	13.24	8.03	--	5.21
	8/25/2011	13.10	13.24	4.35	--	8.89
	6/26/2012	13.13	13.24	4.13	--	9.11
	11/26/2012	13.16	13.24	5.30	--	7.94
	7/22/2013	13.08	13.24	4.39	--	8.85
	11/11/2013	13.08	13.24	8.51	--	4.73
AD-1	7/7/2008	-	18.25	Unable to Open		
	7/10/2009	--	18.25	Unable to Open		
	9/10/2010	--	18.25	5.79	--	12.46
	8/25/2011	10.91	18.25	4.23	--	14.02
	6/26/2012	--	18.25	Unable to Open		
	11/26/2012	10.95	18.25	6.15	--	12.10
	7/22/2013	--	18.25	Could Not Access		
	11/11/2013	10.93	18.25	6.33	--	11.92

DTB- Depth to Bottom TOC- Top of Casing -- Not applicable
DTW- Depth to Water DTP- Depth to Product GW- Ground water
* TOC measurement not applicable, LNAPL recovery trailer installed

Table 1
Site-Wide Groundwater Gauging Data
Hess Corporation- Former Port Reading Complex
750 Cliff Road
Port Reading, Middlesex County, New Jersey

Well	Date	DTB (ft)	TOC (ft)	DTW (ft)	DTP (ft)	GW Elevation (ft)
AD-2	7/7/2008	17.13	18.95	6.72	--	12.23
	7/10/2009	17.13	18.95	6.49	--	12.46
	9/7/2010	--	18.95	7.76	--	11.19
	8/25/2011	17.04	18.95	6.18	--	12.77
	6/26/2012	17.15	18.95	6.32	--	12.63
	11/26/2012	17.18	18.95	7.90	--	11.05
	7/22/2013	17.12	18.95	6.23	--	12.72
	11/11/2013	17.15	18.95	7.97	--	10.98
AD-2DD	7/22/2013	41.00	16.59	9.30	--	7.29
	11/11/2013	39.97	16.59	9.61	--	6.98
	12/4/2013	41.62	16.59	10.68	--	5.91
AD-3	7/7/2008	13.70	22.00	9.63	--	12.37
	7/10/2009	13.70	22.00	9.41	--	12.59
	9/8/2010	--	22.00	10.40	--	11.60
	8/25/2011	13.70	22.00	9.36	--	12.64
	6/26/2012	14.00	22.00	8.30	--	13.70
	11/26/2012	14.00	22.00	10.93	--	11.07
	7/22/2013	13.90	22.00	9.60	--	12.40
	11/11/2013	13.88	22.00	9.82	--	12.18
AD-3D	7/22/2013	28.95	19.75	8.90	--	10.85
	11/11/2013	28.93	19.75	9.39	--	10.36
	12/4/2013	28.90	19.75	11.21	--	8.54
AD-4	7/7/2008	14.56	17.55	5.37	--	12.18
	7/10/2009	14.56	17.55	5.14	--	12.41
	9/7/2010	--	17.55	6.97	--	10.58
	8/25/2011	14.57	17.55	5.90	--	11.65
	6/26/2012	14.61	17.55	6.04	--	11.51
	11/26/2012	14.60	17.55	7.42	--	10.13
	7/22/2013	14.63	17.55	6.17	--	11.38
	11/11/2013	14.88	17.55	7.90	--	9.65
AD-5	7/7/2008	15.60	17.73	Unable to Open		
	7/10/2009	15.60	17.73	5.39	--	12.34
	9/7/2011	--	17.73	6.85	--	10.88
	8/25/2011	14.59	17.73	5.20	--	12.53
	6/26/2012	14.64	17.73	5.25	--	12.48
	11/26/2012	14.65	17.73	6.75	--	10.98
	7/22/2013	14.65	17.73	5.25	--	12.48
	11/11/2013	13.09	17.73	8.16	--	9.57
AD-5D	3/30/2012	--	17.58	6.02	NP	11.56
	6/26/2012	28.85	17.58	8.06	--	9.52
	11/26/2012	28.80	17.58	8.47	--	9.11
	7/22/2013	28.86	17.58	8.10	--	9.48
	11/11/2013	28.84	17.58	8.16	--	9.42
	12/4/2013	28.66	17.58	9.27	--	8.31

DTB- Depth to Bottom   TOC- Top of Casing   -- Not applicable
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Hess Corporation- Former Port Reading Complex
750 Cliff Road
Port Reading, Middlesex County, New Jersey

Well	Date	DTB (ft)	TOC (ft)	DTW (ft)	DTP (ft)	GW Elevation (ft)
AD-6	7/7/2008	14.38	19.18	6.56	--	12.62
	7/10/2009	14.38	19.18	6.45	--	12.73
	9/7/2010	--	19.18	7.65	--	11.53
	8/25/2011	14.61	19.18	6.20	--	12.98
	6/26/2012	14.68	19.18	6.50	--	12.68
	11/26/2012	14.62	19.18	8.03	--	11.15
	7/22/2013	14.66	19.18	6.71	--	12.47
	11/11/2013	14.60	19.18	8.21	--	10.97
AD-7	11/26/2012	19.76	13.32	4.46	--	8.86
	7/22/2013	19.75	13.32	3.35	--	9.97
	11/12/2013	19.76	13.32	4.89	--	8.43
		Could not be located				
AD-8	7/22/2013	14.75	15.88	5.95	--	9.93
	11/12/2013	14.74	15.88	6.39	--	9.49
AD-9D	7/22/2013	26.25	15.52	7.85	--	7.67
	12/4/2013	26.61	15.52	9.29	--	6.23
BG-2	7/7/2008	9.75	11.13	5.14	--	5.99
	7/10/2009	9.75	11.13	4.42	--	6.71
	9/7/2010	--	11.13	--	--	--
	8/25/2011	10.95	11.13	3.35	--	7.78
	6/26/2012	10.95	11.13	3.85	--	7.28
	11/26/2012	10.89	11.13	4.67	--	6.46
	7/22/2013	--	11.13	Could Not Access		
	11/11/2013	11.00	11.13	6.64	--	4.49
BG-3	7/7/2008	--	12.54	Unable To Locate		
	7/10/2009	--	12.54	Unable To Locate		
	9/7/2010	--	12.54	Unable To Locate		
	8/25/2011	--	12.54	Unable To Locate		
	6/26/2012	10.72	12.54	2.85	--	9.69
	11/26/2012	10.76	12.54	4.83	--	7.71
	7/22/2013	10.82	12.54	5.60	--	6.94
	11/11/2013	10.78	12.54	6.58	--	5.96
L1-1	7/7/2008	15.10	13.38	6.14	--	7.24
	7/10/2009	15.10	13.38	6.46	--	6.92
	9/7/2010	--	13.38	--	--	--
	8/25/2011	14.91	13.38	5.03	--	8.35
	6/26/2012	14.98	13.38	6.34	--	7.04
	11/26/2012	14.42	13.38	7.13	--	6.25
	7/22/2013	14.72	13.38	5.65	--	7.73
	11/11/2013	14.70	13.38	8.56	--	4.82
L1-2	7/7/2008	15.05	10.98	5.45	--	5.53
	7/10/2009	15.05	10.98	Unable to Open		
	9/7/2010	--	10.98	--	--	--
	8/25/2011	14.40	10.98	5.78	--	5.20
	6/26/2012	14.45	10.98	6.28	--	4.70
	11/26/2012	14.64	10.98	6.70	--	4.28
	7/22/2013	14.35	10.98	5.35	--	5.63
	11/11/2013	14.31	10.98	7.19	--	3.79

DTB- Depth to Bottom   TOC- Top of Casing   -- Not applicable
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Table 1
Site-Wide Groundwater Gauging Data
Hess Corporation- Former Port Reading Complex
750 Cliff Road
Port Reading, Middlesex County, New Jersey

Well	Date	DTB (ft)	TOC (ft)	DTW (ft)	DTP (ft)	GW Elevation (ft)
L1-3	7/7/2008	10.90	11.50	Unable To Locate		
	7/10/2009	10.90	11.50	6.96	--	4.54
	9/7/2010	--	11.50	--	--	--
	8/25/2011	10.94	11.50	6.56	--	4.94
	6/26/2012	11.00	11.50	6.90	--	4.60
	11/26/2012	10.58	11.50	7.23	--	4.27
	7/22/2013	11.03	11.50	5.78	--	5.72
	11/11/2013	10.97	11.50	8.06	--	3.44
L1-4	7/7/2008	11.02	12.97	Unable To Locate		
	7/10/2009	11.02	12.97	8.42	--	4.55
	9/7/2010	--	12.97	--	--	--
	8/25/2011	11.00	12.97	8.98	--	3.99
	6/26/2012	11.00	12.97	8.36	--	4.61
	11/26/2012	11.00	12.97	8.54	--	4.43
	7/22/2013	11.08	12.97	7.17	--	5.80
	11/11/2013	11.04	12.97	9.69	--	3.28
L1-SW	7/22/2013	--	5.48	3.20	--	3.18
	11/11/2013	--	5.48	1.34	--	1.32
LN-1	7/7/2008	13.12	12.19	4.79	--	7.40
	7/10/2009	13.12	12.19	4.60	--	7.59
	9/7/2010	--	12.19	--	--	--
	8/25/2011	13.36	12.19	3.84	--	8.35
	6/26/2012	13.37	12.19	3.96	--	8.23
	11/26/2012	13.27	12.19	5.00	--	7.19
	7/22/2013	13.33	12.19	3.95	--	8.24
	11/11/2013	13.33	12.19	6.86	--	5.33
LN-2	7/7/2008	11.38	12.21	5.90	--	6.31
	7/10/2009	11.38	12.21	5.77	--	6.44
	9/7/2010	--	12.21	--	--	--
	8/25/2011	11.50	12.21	5.32	--	6.89
	6/26/2012	11.50	12.21	5.53	--	6.68
	11/26/2012	11.43	12.21	6.06	--	6.15
	7/22/2013	11.38	12.21	5.35	--	6.86
	11/11/2013	11.38	12.21	7.24	--	4.97
LN-3	7/7/2008	13.92	11.34	5.48	--	5.86
	7/10/2009	13.92	11.34	5.32	--	6.02
	9/7/2011	--	11.34	--	--	--
	8/25/2011	12.18	11.34	4.95	--	6.39
	6/26/2012	12.18	11.34	5.06	--	6.28
	11/26/2012	13.10	11.34	5.37	--	5.97
	7/22/2013	13.12	11.34	4.82	--	6.52
	11/11/2013	13.12	11.34	6.62	--	4.72
LN-4	7/7/2008	13.92	13.55	7.64	--	5.91
	7/10/2009	13.92	13.55	Unable to Gauge		
	9/7/2010	--	13.55	--	--	--
	8/25/2011	14.29	13.55	6.98	--	6.57
	6/26/2012	14.29	13.55	7.10	--	6.45
	11/26/2012	14.10	13.55	7.60	--	5.95
	7/22/2013	14.20	13.55	6.85	--	6.70
	11/11/2013	14.21	13.55	8.76	--	4.79

DTB- Depth to Bottom TOC- Top of Casing -- Not applicable
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Table 1
Site-Wide Groundwater Gauging Data
Hess Corporation- Former Port Reading Complex
750 Cliff Road
Port Reading, Middlesex County, New Jersey

Well	Date	DTB (ft)	TOC (ft)	DTW (ft)	DTP (ft)	GW Elevation (ft)
LN-5	8/25/2011	17.00	12.85	5.91	--	6.94
	6/26/2012	17.03	12.85	5.54	--	7.31
	11/26/2012	16.98	12.85	6.83	--	6.02
	7/22/2013	16.93	12.85	4.50	--	8.35
	11/11/2013	16.93	12.85	6.13	--	6.72
LN-6	8/25/2011	17.15	14.56	7.99	--	6.57
	6/26/2012	17.15	14.56	8.30	--	6.26
	11/26/2012	17.12	14.56	8.81	--	5.75
	7/22/2013	17.10	14.56	7.98	--	6.58
	11/11/2013	17.10	14.56	9.74	--	4.82
LN-7	8/25/2011	17.17	15.75	8.26	--	7.49
	6/26/2012	17.17	15.75	8.55	--	7.20
	11/26/2012	17.13	15.75	9.19	--	6.56
	7/22/2013	16.90	15.75	8.46	--	7.29
	11/11/2013	16.90	15.75	9.87	--	5.88
LN-SW	7/22/2013	--	5.19	3.40	--	3.09
	11/11/2013	--	5.19	1.90	--	1.59
LPG-1	7/7/2008	8.60	13.74	4.87	--	8.87
	7/10/2009	8.60	13.74	4.65	--	9.09
	9/8/2010	--	13.74	5.35	--	8.39
	8/25/2011	8.48	13.74	3.60	--	10.14
	6/26/2012	8.26	13.74	2.42	--	11.32
	11/26/2012	8.21	13.74	6.00	--	7.74
	7/22/2013	8.26	13.74	3.62	--	10.12
	11/11/2013	8.10	13.74	7.63	--	6.11
LPG-2	7/7/2008	9.64	9.30	3.41	--	5.89
	7/10/2009	9.64	9.30	3.12	--	6.18
	9/8/2010	--	9.30	3.13	--	6.17
	8/25/2011	9.67	9.30	2.71	--	6.59
	6/26/2012	9.69	9.30	2.71	--	6.59
	11/26/2012	9.70	9.30	3.35	--	5.95
	7/22/2013	9.70	9.30	3.73	--	5.57
	11/11/2013	9.69	9.30	5.89	--	3.41
LS-1R	7/7/2008	15.71	14.49	2.92	--	11.57
	7/10/2009	15.71	14.49	3.15	--	11.34
	9/7/2010	--	14.49	--	--	--
	8/25/2011	15.93	14.49	2.86	--	11.63
	6/26/2012	15.92	14.49	2.55	--	11.94
	11/26/2012	15.81	14.49	3.72	--	10.77
	7/22/2013	15.90	14.49	2.71	--	11.78
	11/11/2013	15.90	14.49	4.97	--	9.52
LS-2	7/7/2008	12.11	11.69	1.81	--	9.88
	7/10/2009	12.11	11.69	1.66	--	10.03
	9/7/2010	--	11.69	--	--	--
	8/25/2011	12.08	11.69	1.96	--	9.73
	6/26/2012	12.06	11.69	1.02	--	10.67
	11/26/2012	12.07	11.69	3.11	--	8.58
	7/22/2013	11.88	11.69	0.93	--	10.76
	11/11/2013	11.93	11.69	2.99	--	8.70

DTB- Depth to Bottom TOC- Top of Casing -- Not applicable
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Table 1
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Hess Corporation- Former Port Reading Complex
750 Cliff Road
Port Reading, Middlesex County, New Jersey

Well	Date	DTB (ft)	TOC (ft)	DTW (ft)	DTP (ft)	GW Elevation (ft)
LS-3	7/7/2008	12.90	10.70	1.87	--	8.83
	7/10/2009	12.90	10.70	1.19	--	9.51
	9/7/2010	--	10.70	--	--	--
	8/25/2011	12.63	10.70	1.13	--	9.57
	6/26/2012	12.63	10.70	0.69	--	10.01
	11/26/2012	12.75	8.30	0.90	--	7.40
	7/22/2013	12.66	8.30	0.82	--	7.48
	11/11/2013	12.66	8.30	1.92	--	6.38
LS-4	7/7/2008	13.44	11.25	2.19	--	9.06
	7/10/2009	13.44	11.25	1.82	--	9.43
	9/7/2010	--	11.25	--	--	--
	8/25/2011	13.29	11.25	1.74	--	9.51
	6/26/2012	13.29	11.25	1.58	--	9.67
	11/26/2012	13.30	11.25	1.90	--	9.35
	7/22/2013	13.25	11.25	2.60	--	8.65
	11/11/2013	13.26	11.25	4.12	--	7.13
PER-1	7/7/2008	17.65	19.29	9.46	--	9.83
	7/10/2009	17.65	19.29	8.69	--	10.60
	9/8/2010	--	19.29	10.17	--	9.12
	8/25/2011	17.65	19.29	9.85	--	9.44
	6/26/2012	17.69	19.29	9.40	--	9.89
	11/26/2012	17.74	19.29	10.50	--	8.79
	7/22/2013	17.65	19.29	8.79	--	10.50
	11/11/2013	19.26	19.29	9.17	--	10.12
PER-2	7/7/2008	12.14	12.91	6.74	--	6.17
	7/10/2009	12.14	12.91	6.19	--	6.72
	9/9/2010	--	12.91	8.59	--	4.32
	8/25/2011	12.13	12.91	5.62	--	7.29
	6/26/2012	12.20	12.91	5.94	--	6.97
	11/26/2012	12.17	12.91	5.62	--	7.29
	7/22/2013	12.20	12.91	5.25	--	7.66
	11/11/2013	12.19	12.91	6.21	--	6.70
PER-2D	7/22/2013	31.70	11.32	5.61	--	5.71
	12/4/2013	31.60	11.32	6.91	--	4.41
PER-3	7/7/2008	12.19	9.55	6.13	--	3.42
	7/10/2009	12.19	9.55	5.01	--	4.54
	9/9/2011	--	9.55	5.19	--	4.36
	8/25/2011	12.19	9.55	5.00	--	4.55
	6/26/2012	12.25	9.55	4.61	--	4.94
	11/26/2012	12.26	9.55	4.05	--	5.50
	7/22/2013	12.25	9.55	4.20	--	5.35
	11/11/2013	12.20	9.55	8.47	--	1.08
PER-3D	7/22/2013	31.38	7.29	5.56	--	1.73
	12/4/2013	31.22	7.29	5.23	--	2.06

DTB- Depth to Bottom   TOC- Top of Casing   -- Not applicable
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Hess Corporation- Former Port Reading Complex
750 Cliff Road
Port Reading, Middlesex County, New Jersey

Well	Date	DTB (ft)	TOC (ft)	DTW (ft)	DTP (ft)	GW Elevation (ft)
PER-4	7/7/2008	14.10	12.78	6.86	--	5.92
	7/10/2009	14.10	12.78	5.96	--	6.82
	9/7/2010	--	12.78	7.02	--	5.76
	8/25/2011	16.32	12.78	6.15	--	6.63
	6/26/2012	16.30	12.78	6.36	--	6.42
	11/26/2012	15.70	10.23	6.70	--	3.53
	7/22/2013	15.68	10.23	4.49	--	5.74
	11/11/2013	15.67	10.23	7.89	--	2.34
PER-5	7/7/2008	--	20.47	Unable to Open		
	7/10/2009	--	20.47	Unable to Open		
	9/8/2010	--	20.47	11.41	--	9.06
	8/25/2011	14.37	20.47	1.02	--	19.45
	6/26/2012	14.43	20.47	3.24	--	17.23
	11/26/2012	14.44	20.47	10.97	--	9.50
	7/22/2013	14.40	20.47	3.46	--	17.01
	11/11/2013	14.40	20.47	11.27	--	9.20
PER-6	7/7/2008	14.64	21.93	0.92	--	21.01
PER-6R	12/5/2008	22.00	23.76	13.59	--	10.17
	7/10/2009	22.00	23.76	5.00	--	18.76
	9/10/2010	--	23.76	2.13		21.63
	8/25/2011	21.92	23.76	1.94	--	21.82
	6/26/2012	21.60	23.76	3.93	--	19.83
	11/26/2012	21.99	23.76	13.11	--	10.65
	7/22/2013	21.57	23.76	4.11	--	19.65
	11/11/2013	21.97	23.76	13.64	--	10.12
PER-7	7/7/2008	17.10	11.15	7.09	--	4.06
	7/10/2009	17.10	11.15	4.86	--	6.29
	9/8/2010	--	11.15	7.21	--	3.94
	8/25/2011	17.03	11.15	8.18	--	2.97
	6/26/2012	16.67	11.15	5.91	--	5.24
	11/26/2012	16.65	11.15	6.65	--	4.50
	7/22/2013	16.64	11.15	6.13	--	5.02
	11/11/2013	16.63	11.15	6.89	--	4.26
PER-8	7/7/2008	18.14	10.40	6.52	--	3.88
	7/10/2009	18.14	10.40	5.58	--	4.82
	9/8/2010	--	10.40	6.50	--	3.90
	8/25/2011	18.17	10.40	0.00	--	10.40
	6/26/2012	14.61	10.40	4.71	--	5.69
	11/26/2012	14.60	7.48	5.90	--	1.58
	7/22/2013	14.59	7.48	5.28	--	2.20
	11/11/2013	14.58	7.48	6.51	--	0.97
PER-9	11/11/2013	17.89	8.45	6.49	--	1.96
PER-9D	11/11/2013	37.44	8.29	6.72	--	1.57
	12/4/2013	37.41	8.29	5.59	--	2.70
PER-9DD	11/11/2013	67.47	8.34	7.03	--	1.31
	12/4/2013	67.44	8.34	5.97	--	2.37
PER-10	7/22/2013	18.90	12.18	7.75	--	4.43
	11/11/2013	18.87	12.18	11.63	--	0.55

DTB- Depth to Bottom　　TOC- Top of Casing　　-- Not applicable
DTW- Depth to Water　　DTP- Depth to Product　　GW- Ground water
* TOC measurement not applicable, LNAPL recovery trailer installed

Table 1
Site-Wide Groundwater Gauging Data
Hess Corporation- Former Port Reading Complex
750 Cliff Road
Port Reading, Middlesex County, New Jersey

Well	Date	DTB (ft)	TOC (ft)	DTW (ft)	DTP (ft)	GW Elevation (ft)
PER-10D	7/22/2013	32.09	11.93	10.27	--	1.66
	12/4/2013	32.14	11.93	9.84	--	2.09
PL-1	7/7/2008	19.94	11.82	1.84	--	9.98
	7/10/2009	19.94	11.82	1.95	--	9.87
	9/9/2010	--	11.82	3.50	3.48	8.33
	8/25/2011	19.88	11.82	2.45	--	9.37
PL-1R	6/26/2012	19.86	11.82	4.49	4.45	7.35
PL-1RR	7/22/2013	--	7.35	0.63	0.62	6.73
	11/11/2013	--	7.35	1.68	1.67	5.68
PL-2	7/7/2008	18.61	11.78	2.09	--	9.69
	7/10/2009	18.61	11.78	2.34	2.31	9.46
	9/9/2010	--	11.78	2.92	3.31	8.63
	8/25/2011	16.89	11.78	2.39	2.37	9.40
	6/26/2012	16.95	11.78	1.91	--	9.87
	11/26/2012	16.94	11.78	2.05	2.04	9.74
	7/22/2013	16.94	11.78	1.92	--	9.86
	11/11/2013	--	11.78	3.23	3.21	8.56
PL-3	7/7/2008	19.89	12.81	2.75	--	10.06
PL-3R	12/5/2008	21.30	12.27	3.38	--	8.89
	7/10/2009	21.30	12.27	Unable to Gauge		
	9/9/2010	--	12.27	2.74	--	9.53
	8/25/2011	18.27	12.27	2.31	--	9.96
	6/26/2012	18.27	12.27	2.15	--	10.12
	11/26/2012	18.57	12.27	2.92	2.91	9.36
	7/22/2013	18.60	12.27	2.49	SHEEN	9.78
	11/11/2013	18.60	12.27	3.87	--	8.40
PL-4	7/7/2008	17.14	13.30	3.32	--	9.98
PL-4R	12/5/2008	21.30	12.40	3.23	--	9.17
	7/10/2009	21.30	12.40	2.85	--	9.55
	9/9/2010	--	12.40	3.05	--	9.35
	8/25/2011	21.60	12.40	2.41	--	9.99
	6/26/2012	20.85	12.40	2.79	--	9.61
	11/26/2012	21.00	12.40	3.46	--	8.94
	7/22/2013	20.80	12.40	2.93	--	9.47
	11/11/2013	20.85	12.40	4.59	--	7.81
PL-5	7/7/2008	10.17	9.08	6.50	1.04	5.86
	7/10/2009	10.17	9.08	1.77	1.52	7.46
	9/9/2010	--	9.08	Unable to Gauge		
	8/25/2011	--	9.08	1.05	0.70	8.24
	6/26/2012	--	9.08	1.12	1.11	7.97
	11/26/2012	--	9.08	1.26	1.25	7.83
	7/22/2013	--	9.08	1.05	1.03	8.04
	11/11/2013	--	9.08	1.99	1.98	7.10

DTB- Depth to Bottom TOC- Top of Casing -- Not applicable
DTW- Depth to Water DTP- Depth to Product GW- Ground water
* TOC measurement not applicable, LNAPL recovery trailer installed

Table 1
Site-Wide Groundwater Gauging Data
Hess Corporation- Former Port Reading Complex
750 Cliff Road
Port Reading, Middlesex County, New Jersey

Well	Date	DTB (ft)	TOC (ft)	DTW (ft)	DTP (ft)	GW Elevation (ft)
PL-6	7/7/2008	15.29	11.95	2.51	--	9.44
PL-6R	12/5/2008	21.74	11.49	2.46	--	9.03
	7/10/2009	21.74	11.49	2.19	--	9.30
	9/9/2010	--	11.49	2.36	--	9.13
	8/25/2011	21.59	11.49	1.81	--	9.68
	6/26/2012	21.59	11.49	2.60	--	8.89
	11/26/2012	21.62	11.49	2.35	--	9.14
	7/22/2013	21.62	11.49	5.22	--	6.27
	11/11/2013	21.62	11.49	3.97	--	7.52
PL-7	7/7/2008	19.58	13.06	4.53	--	8.53
	7/10/2009	19.58	13.06	4.63	--	8.43
	9/9/2010	--	13.06	5.27	--	7.79
	8/25/2011	19.53	13.06	2.91	--	10.15
	6/26/2012	19.50	13.06	3.21	--	9.85
	11/26/2012	19.59	13.06	4.79	--	8.27
	7/22/2013	19.58	13.06	4.02	--	9.04
	11/11/2013	19.58	13.06	5.59	--	7.47
PL-8	7/7/2008	19.69	12.39	4.09	--	8.30
PL-8R	12/5/2008	19.61	11.96	3.83	--	8.13
	7/10/2009	19.61	11.96	3.46	--	8.50
	9/9/2010	--	11.96	4.43	--	7.53
	8/25/2011	21.74	11.96	2.62	--	9.34
	6/26/2012	21.74	11.96	3.36	--	8.60
	11/26/2012	21.76	11.96	3.75	--	8.21
	7/22/2013	21.75	11.96	3.11	--	8.85
	11/11/2013	21.76	11.96	4.77	--	7.19
PL-9	7/7/2008	18.65	11.95	2.23	--	9.72
PL-9R	12/5/2008	21.33	11.26	2.47	--	8.79
	7/10/2009	21.33	11.26	1.69	--	9.57
	9/9/2010	--	11.26	1.90	--	9.36
	8/25/2011	20.91	11.26	2.31	--	8.95
	6/26/2012	20.91	11.26	1.40	--	9.86
	11/26/2012	20.84	11.26	3.75	--	7.51
	7/22/2013	20.84	11.26	1.48	--	9.78
	11/11/2013	20.84	11.26	4.10	--	7.16
SP-1	7/7/2008	14.11	14.07	6.03	--	8.04
	7/10/2009	14.11	14.07	5.61	--	8.46
	9/7/2010	--	14.07	--	--	--
	8/25/2011	--	14.07	--	--	--
	6/26/2012	12.00	14.07	5.30	--	8.77
	11/26/2012	12.05	14.07	7.32	--	6.75
	7/22/2013	12.00	9.22	4.60	--	4.62
	11/11/2013	11.97	9.22	8.48	--	0.74

DTB- Depth to Bottom   TOC- Top of Casing   -- Not applicable
DTW- Depth to Water   DTP- Depth to Product   GW- Ground water
* TOC measurement not applicable, LNAPL recovery trailer installed

Table 1
Site-Wide Groundwater Gauging Data
Hess Corporation- Former Port Reading Complex
750 Cliff Road
Port Reading, Middlesex County, New Jersey

Well	Date	DTB (ft)	TOC (ft)	DTW (ft)	DTP (ft)	GW Elevation (ft)
SP-2	7/7/2008	14.69	15.24	8.23	--	7.01
	7/10/2009	14.69	15.24	7.52	--	7.72
	9/7/2010	--	15.24	--	--	--
	8/25/2011	--	15.24	--	--	--
	6/26/2012	14.93	15.24	7.28	--	7.96
	11/26/2012	14.85	15.24	8.54	--	6.70
	7/22/2013	12.30	10.73	4.70	--	6.03
	11/11/2013	12.26	10.73	9.19	--	1.54
SP-3	7/7/2008	14.90	14.66	7.18	--	7.48
	7/10/2009	14.90	14.66	6.38	--	8.28
	9/7/2010	--	14.66	--	--	--
	8/25/2011	--	14.66	--	--	--
	6/26/2012	16.39	14.66	5.91	--	8.75
	11/26/2012	16.43	14.66	7.38	--	7.28
	7/22/2013	11.97	9.29	4.61	--	4.68
	11/11/2013	11.98	9.29	8.44	--	0.85
TC-1	7/7/2008	17.66	20.48	9.07	--	11.41
	7/10/2009	17.66	20.48	8.17	--	12.31
	9/7/2010	--	20.48	9.84	--	10.64
	8/25/2011	17.60	20.48	9.18	--	11.30
	6/26/2012	17.65	20.48	9.17	--	11.31
	11/26/2012	17.76	20.48	10.35	--	10.13
	7/22/2013	17.63	20.48	7.71	--	12.77
	11/11/2013	17.75	20.48	10.60	--	9.88
TC-2	7/7/2008	16.11	19.57	8.04	--	11.53
	7/10/2009	16.11	19.57	7.26	--	12.31
	9/7/2010	--	19.57	8.83	--	10.74
	8/25/2011	14.96	19.57	8.23	--	11.34
	6/26/2012	14.93	19.57	8.05	--	11.52
	11/26/2012	14.90	19.57	9.50	--	10.07
	7/22/2013	14.89	19.57	6.63	--	12.94
	11/11/2013	14.88	19.57	9.71	--	9.86
TC-3	7/7/2008	17.34	19.55	7.65	--	11.90
	7/10/2009	17.34	19.55	7.15	--	12.40
	9/7/2010	--	19.55	8.60	--	10.95
	8/25/2011	17.28	19.55	8.12	--	11.43
	6/26/2012	17.21	19.55	8.12	--	11.43
	11/26/2012	17.20	19.55	9.32	--	10.23
	7/22/2013	17.23	19.55	6.57	--	12.98
	11/11/2013	17.18	19.55	9.64	--	9.91
TF-1	7/7/2008	10.27	10.82	2.62	--	8.20
	7/10/2009	10.27	10.82	2.54	--	8.28
	9/7/2010	--	10.82	--	--	--
	8/25/2011	12.09	10.82	2.26	--	8.56
	6/26/2012	12.09	10.82	3.03	--	7.79
	11/26/2012	12.15	10.82	2.78	2.77	8.05
	7/22/2013	--	10.82	2.68	2.67	8.15
	11/11/2013	12.15	10.82	3.53	--	7.29

DTB- Depth to Bottom TOC- Top of Casing -- Not applicable
DTW- Depth to Water DTP- Depth to Product GW- Ground water
* TOC measurement not applicable, LNAPL recovery trailer installed

Table 1
Site-Wide Groundwater Gauging Data
Hess Corporation- Former Port Reading Complex
750 Cliff Road
Port Reading, Middlesex County, New Jersey

Well	Date	DTB (ft)	TOC (ft)	DTW (ft)	DTP (ft)	GW Elevation (ft)
TF-2	7/7/2008	--	10.13	--	1.79	--
	7/10/2009	--	10.13	--	1.94	--
	9/7/2010	--	10.13	--	--	--
	8/25/2011	--	10.13	Unable to Gauge		
	6/26/2012	--	10.13	Unable to Gauge		
	11/26/2012	--	NA*	7.01	6.97	--
	7/22/2013	--	NA*	6.37	6.36	--
	11/11/2013	--	NA*	7.13	7.12	--
TF-3	7/7/2008	11.76	10.73	2.33	--	8.40
	7/10/2009	11.76	10.73	2.41	--	8.32
	9/7/2010	--	10.73	--	--	--
	8/25/2011	11.78	10.73	1.89	--	8.84
	6/26/2012	11.79	10.73	2.66	--	8.07
	11/26/2012	11.79	10.73	2.59	--	8.14
	7/22/2013	11.70	10.73	1.50	--	9.23
	11/11/2013	11.80	10.73	3.23	--	7.50
TL-1	7/22/2013	12.68	8.76	5.40	--	3.36
	11/11/2013	12.68	8.76	5.82	--	2.94
TL-2	7/22/2013	14.45	8.44	5.20	--	3.24
	11/11/2013	14.54	8.44	5.39	--	3.05
TL-3	7/22/2013	9.88	8.62	5.79	--	2.83
	11/11/2013	9.88	8.62	5.84	--	2.78
TM-1	7/7/2008	20.11	22.36	9.89	--	12.47
	7/10/2009	20.11	22.36	9.71	--	12.65
	9/8/2010	--	22.36	10.70	--	11.66
	8/25/2011	20.00	22.36	9.35	--	13.01
	6/26/2012	20.62	22.36	9.47	--	12.89
	11/26/2012	20.20	22.36	10.85	--	11.51
	7/22/2013	20.99	22.36	9.19	--	13.17
	11/11/2013	20.78	22.36	11.24	--	11.12
TM-2	7/7/2008	22.16	22.45	10.76	--	11.69
	7/10/2009	22.16	22.45	10.52	--	11.93
	9/8/2010	--	22.45	11.24	--	11.21
	8/25/2011	--	22.45	--	--	--
	6/26/2012	22.08	22.45	10.04	--	12.41
	11/26/2012	22.27	22.45	11.80	--	10.65
	7/22/2013	22.10	22.45	10.11	--	12.34
	11/11/2013	22.20	22.45	12.16	--	10.29
TM-3	7/7/2008	20.80	22.50	10.63	--	11.87
	7/10/2009	20.80	22.50	10.44	--	12.06
	9/8/2010	--	22.50	11.47	--	11.03
	8/25/2011	20.97	22.50	10.20	--	12.30
	6/26/2012	20.95	22.50	10.14	--	12.36
	11/26/2012	22.85	22.50	11.79	--	10.71
	7/22/2013	20.76	22.50	9.91	--	12.59
	11/11/2013	20.75	22.50	12.18	--	10.32

DTB- Depth to Bottom   TOC- Top of Casing   -- Not applicable
DTW- Depth to Water   DTP- Depth to Product   GW- Ground water
* TOC measurement not applicable, LNAPL recovery trailer installed

Table 1
Site-Wide Groundwater Gauging Data
Hess Corporation- Former Port Reading Complex
750 Cliff Road
Port Reading, Middlesex County, New Jersey

Well	Date	DTB (ft)	TOC (ft)	DTW (ft)	DTP (ft)	GW Elevation (ft)
TM-4	7/7/2008	15.28	21.14	8.76	--	12.38
	7/10/2009	15.28	21.14	8.60	--	12.54
	9/8/2010	--	21.14	9.68	--	11.46
	8/25/2011	14.93	21.14	8.08	--	13.06
	6/26/2012	14.91	21.14	8.50	--	12.64
	11/26/2012	15.36	21.14	10.08	--	11.06
	7/22/2013	15.34	21.14	8.17	--	12.97
	11/11/2013	15.35	21.14	9.97	--	11.17
TM-5	7/7/2008	22.13	18.47	8.22	--	10.25
	7/10/2009	22.13	18.47	8.14	--	10.33
	9/10/2010	--	18.47	8.26	--	10.21
	8/25/2011	22.09	18.47	8.12	--	10.35
	6/26/2012	22.09	18.47	7.46	--	11.01
	11/26/2012	22.15	18.47	8.35	--	10.12
	7/22/2013	22.10	18.47	7.81	--	10.66
	11/11/2013	22.10	18.47	9.24	--	9.23
TM-6	7/7/2008	21.20	17.68	6.32	--	11.36
	7/10/2009	21.20	17.68	6.27	--	11.41
	9/10/2010	--	17.68	7.25	--	10.43
	8/25/2011	21.33	17.68	6.22	--	11.46
TM-6R	6/26/2012	20.04	14.06	4.90	--	9.16
	11/26/2012	--	14.06	5.76	5.75	8.31
	7/22/2013	19.95	14.06	4.92	--	9.14
	11/11/2013	19.95	14.06	5.92	--	8.14
TM-7	7/7/2008	21.22	17.03	7.18	--	9.85
	7/10/2009	21.22	17.03	7.11	--	9.92
	9/10/2010	--	17.03	7.70	--	9.33
	8/25/2011	21.83	17.03	6.89	6.88	10.15
	6/26/2012	--	17.03	6.83	6.82	10.21
	11/26/2012	--	17.03	7.72	7.70	9.32
	7/22/2013	--	17.03	6.80	SHEEN	10.23
	11/11/2013	--	17.03	8.17	8.16	8.87
TR-1R	7/22/2013	15.02	13.70	5.88	--	7.82
	11/11/2013	15.02	13.70	6.39	--	7.31
TR-2	7/7/2008	21.44	14.70	2.99	--	11.71
TR-2R	12/5/2008	21.45	14.66	5.27	--	9.39
	7/10/2009	21.45	14.66	Unable To Locate		
	9/7/2010	--	14.66	5.04	--	9.62
	8/25/2011	--	14.66	--	--	--
	6/26/2012	--	14.66	0.00	--	14.66
	11/26/2012	20.25	14.66	5.24	--	9.42
	7/22/2013	--	14.66	3.62	3.61	11.05
	11/11/2013	--	14.66	4.09	4.08	10.58

DTB- Depth to Bottom　TOC- Top of Casing　-- Not applicable
DTW- Depth to Water　DTP- Depth to Product　GW- Ground water
* TOC measurement not applicable, LNAPL recovery trailer installed

Table 1
Site-Wide Groundwater Gauging Data
Hess Corporation- Former Port Reading Complex
750 Cliff Road
Port Reading, Middlesex County, New Jersey

Well	Date	DTB (ft)	TOC (ft)	DTW (ft)	DTP (ft)	GW Elevation (ft)
TR-3	7/7/2008	16.94	12.96	3.83	--	9.13
TR-3R	12/5/2008	16.88	12.93	4.19	--	8.74
	7/10/2009	16.88	12.93	3.20	--	9.73
TR-3RR	7/22/2013	14.66	9.65	2.97	--	6.68
	11/11/2013	14.66	9.65	3.68	--	5.97
TR-4	9/10/2010	--	14.71	5.00	--	9.71
	8/25/2011	--	14.71	--	--	--
TR-4R	11/26/2012	14.60	12.10	4.58	--	7.52
	7/22/2013	14.57	12.10	1.98	--	10.12
	11/11/2013	14.59	12.10	3.89	--	8.21
TR-4D	11/26/2012	24.60	12.37	5.70	--	6.67
	7/22/2013	24.95	12.37	4.71	--	7.66
	12/4/2013	24.46	12.37	6.67	--	5.70
TR-4DD	7/22/2013	56.75	12.59	5.35	--	7.24
	12/4/2013	55.88	12.59	6.84	--	5.75
TR-5	11/26/2012	--	14.09	Could not Locate		
	7/22/2013	10.58	12.00	3.64	--	8.36
	11/11/2013	10.58	12.00	5.82	--	6.18
TR-6	11/26/2012	--	12.90	Could Not Access		
	7/22/2013	10.71	12.90	3.98	--	8.92
	11/11/2013	10.71	12.90	5.52	--	7.38
TR-6D	7/22/2013	28.30	10.82	3.69	--	7.13
	12/4/2013	28.15	10.82	6.29	--	4.53
Pond Gauge	10/22/2012	--	6.37	2.20	--	4.17
DB-SW	7/22/2013	--	10.72	5.00	--	5.22
	11/11/2013	--	10.72	3.12	--	3.34

DTB- Depth to Bottom TOC- Top of Casing -- Not applicable
DTW- Depth to Water DTP- Depth to Product GW- Ground water
* TOC measurement not applicable, LNAPL recovery trailer installed

Table 2
Hess Corporation Port Reading Complex
750 Cliff Road
Port Reading, Middlesex County, New Jersey
Aeration Basins Ecological Comparison Table

		Surface Water (ug/L)				Soil (mg/kg)						
		Fresh Water (FW2) Criteria						EcoSSLs20				
		Aquatic		Human Health								
Toxic Substance	CAS Number	Acute	Chronic		Highest GW Concentration found in AOC 5 associated wells (2014) (ug/L)	Wildlife PRGs (flora and fauna)	Terrestrial Plant Tox Benchmarks	Plants	Soil Invertebrates	Avian	Mammalian	Greatest Soil Concentration Detected
Arsenic	7440-38-2	340(d)(s)	150(d)(s)	0.017(hc)(T)	**16.0**	9.99,10	10	18		43	46	NS
Bis(2-ethylhexyl) phthalate	117-81-7		0.3[8]	1.2(hc)	**1.7 J**	0.925[8]						NS
Di-n-butyl phthalate	84-74-2		9.7[8]	2,000(h)	**19.1 B**	200[9] 0.15[8]						NS
Chromium	7440-47-3		428	92(h)(T)	**10.3**	0.412	1					**161**
Lead	7439-92-1	38(d)(s)	5.4(d)(s)	5.0(h)(T)	**10.7**	40.511 0.05378	50	120	1,700	11	56	NS
Vanadium	7440-62-2		12[8]		**70.6**	2[9]	2			7.8	280	NS

Detection in **Bold** exceed one or more applicable Ecological Criteria
(a) Criteria as listed at (f)3 below as formula
(b) Criteria as listed at (f)4 below as formula
(d) Criterion is expressed as a function of the Water Effect Ratio (WER). For criterion in the table, WER equates to the default value of 1.0. (fc) Criteria expressed as free cyanide (as CN)/L
(h) Human health noncarcinogen
(hc) Human health carcinogen
(s) Dissolved criterion
(T) Total recoverable criterion
NOTE: See Page 7/7 (SW Calculations tab) for Surface Water Calculator for metals.
8. USEPA Region 5, RCRA Ecological Screening Levels (ESLs) represent a protective benchmark (e.g., water quality criteria, sediment quality guidelines/ criteria, and chronic no adverse effect levels) for 223 contaminants and are not intended to serve as cleanup levels, but are intended to function as screening levels. http://www.epa.gov/reg5rcra/ca/ESL.pdf
11. Wildlife Preliminary Remediation Goal based on woodcock study.
12. Wildlife Preliminary Remediation Goal based on earthworm study.
J- Indicates Estimated Concentration
B- Indicates Analyte also detected in method blank

TABLE 3
AERATION BASIN AREA - AOC 5
HESS CORPORATION PORT READING COMPLEX
750 CLIFF ROAD
PORT READING, MIDDLESEX COUNTY, NEW JERSEY
SOIL SAMPLING ANALYTICAL RESULTS
NOVEMBER 1, 2013

			SAMPLE ID:	SW-2	NW-2
			SAMPLE MATRIX:	SOIL	SOIL
			SAMPLING DATE:	11/01/13	11/01/13
			SAMPLING DEPTH:	0-6"	0-6"
			LAB ID:	JB51845-1	JB51845-2
Extractable Petroleum Hydrocarbons (EPH)	UNITS	NJDEP Category 1 Residential EPH Soil Remediation Criterion[1]	NJDEP Category 1 Non-residential EPH Soil Remediation Criterion[2]		
TOTAL EPH by NJDEP EPH	mg/kg	5,100	54,000	4,920	727

Metals	UNITS	NJDEP Residential Soil Cleanup Criteria for Chromium[1]	NJDEP Non-residential Soil Cleanup Criteria for Chromium[2]		
Chromium	mg/kg	NA	NA	161	28.9
Chromium^{6+}	mg/kg	240 [3]	20	RU*	RU*

NA: Standard not available
mg/kg: concentrations in milligrams per kilogram
* RU: Results are unavailable due to the high reducing environment of the soils sampled. Chromium^{6+} was quickly reduced to Chromium^{3+} or consumed completely prior to digestion.
[1] Shaded values exceed the New Jersey Department of Environmental Protection (NJDEP) Residential Category 1 EPH SRC and/or Residential Soil Cleanup Criteria
[2] Shaded values exceed the New Jersey Department of Environmental Protection (NJDEP) Non-residential Category 1 EPH SRC and/or Non-residential Soil Cleanup Criteria
[3] Criterion is 240 mg/kg or the site specific Allergic Contact Dermatitis value, whichever is lower

		Gauging Data*					Volatile Organic Compounds																									
Sample ID	**Date**	**TOC Elevation (ft)**	**Depth to Water (ft)**	**Depth to LNAPL (ft)**	**LNAPL Thickness (ft)**	**GW Elevation (ft)**	**Acetone**	**Benzene**	**Bromo dichloro methane**	**2-Butanone (MEK)**	**Carbon disulfide**	**Carbon tetrachloride**	**Chloro benzene**	**Chloro ethane**	**Chloroform**	**Chloromet hane**	**Cyclohexane**	**Dibromoc hlorometh ane**	**1,2-Dibromoet hane**	**1,2-Dichloro benzene**	**1,3-Dichloro benzene**	**1,4-Dichloro benzene**	**Dichloro difluoro methane**	**1,1-Dichloro ethane**	**1,2-Dichloro ethane**	**1,1-Dichloro ethene**	**cis-1,2-Dichloro ethene**	**trans-1,2-Dichloro ethene**	**1,2-Dichloro propane**	**Ethyl benzene**	**Freon 113**	**2-Hexanone**
NJDEP GWQS		**-**	**-**	**-**	**-**	**-**	**6,000**	**1**	**1**	**300**	**700**	**1**	**50**	**5**	**70**	**--**	**--**	**1**	**--**	**600**	**600**	**75**	**1,000**	**50**	**2**	**1**	**70**	**100**	**1**	**700**	**--**	**300**
AB-1	5/13/02	13.85	5.68	--	--	8.17	ND	ND	NA	ND	NA	NR	ND	ND	ND	NR	NA	NR	NR	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA
	09/01/09	13.85	5.25	--	--	8.6	ND	ND	ND	ND	ND	NR	ND	ND	ND	NR	ND	NR	NR	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	09/08/10	13.85	8.51	--	--	5.34	44.8	ND	ND	ND	ND	NR	ND	ND	ND	NR	ND	NR	NR	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	09/20/11	13.85	5.35	--	--	8.50	ND	ND	ND	ND	ND	NR	ND	ND	ND	NR	ND	NR	NR	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	11/26/12	13.85	5.42	--	--	8.43	ND	ND	ND	ND	ND	NR	ND	ND	ND	NR	ND	NR	NR	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	11/11/13	13.85	8.65	--	--	5.20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.67 J	ND	ND	ND	ND	ND
	11/14/14	11.68	7.13	--	--	4.55	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
AB-2	5/13/02	12.03	5.30	--	--	6.73	5.1	0.51	NA	ND	NA	NR	ND	ND	ND	NR	NA	NR	NR	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA
AB-2R	09/01/09	10.81	4.04	--	--	6.77	ND	ND	ND	ND	ND	NR	ND	ND	ND	NR	ND	NR	NR	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	09/08/10	10.81	5.46	--	--	5.35	ND	ND	ND	ND	ND	NR	ND	ND	ND	NR	ND	NR	NR	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	09/20/11	10.81	4.10	--	--	6.71	ND	ND	ND	ND	ND	NR	ND	ND	ND	NR	ND	NR	NR	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	11/26/12	10.81	4.35	--	--	6.46	ND	ND	ND	ND	ND	NR	ND	ND	ND	NR	ND	NR	NR	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	11/11/13	10.81	8.06	--	--	2.75	ND	ND	ND	ND	ND	NR	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	11/14/14	8.53	4.03	--	--	4.50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
AB-3	5/13/02	14.62	7.35	--	--	7.27	ND	**75.9**	NA	ND	NA	NR	5.4	ND	ND	NR	NA	NR	NR	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	7.7	NA	NA
	09/01/09	14.62	3.63	--	--	10.99	ND	**15.1**	ND	ND	ND	NR	1.5	ND	ND	NR	ND	NR	NR	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.31 J	ND	ND
	09/08/10	14.62	5.77	--	--	8.85	ND	ND	ND	ND	ND	NR	ND	ND	ND	NR	ND	NR	NR	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	09/20/11	14.62	4.49	--	--	10.13	ND	ND	ND	ND	ND	NR	ND	ND	ND	NR	ND	NR	NR	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	11/26/12	14.62	3.10	--	--	11.52	ND	**28.8**	ND	ND	ND	NR	7.9	ND	ND	NR	ND	NR	NR	0.29 J	ND	0.38 J	ND	ND	ND	ND	ND	ND	ND	1.2	ND	ND
	11/11/13	14.62	7.27	--	--	7.35	ND	ND	ND	ND	ND	ND	10.3	ND	ND	ND	ND	ND	ND	0.50 J	ND	0.53 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	11/14/14	12.33	4.69	--	--	7.64	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
AB-4	5/13/02	14.24	6.86	--	--	7.38	ND	0.71	NA	ND	NA	NR	ND	ND	ND	NR	NA	NR	NR	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	1.6	NA	NA
	09/01/09	14.24	3.71	--	--	10.53	ND	ND	ND	ND	ND	NR	ND	ND	ND	NR	ND	NR	NR	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	09/08/10	14.24	Dry				NS	NS	NS	NS	NS	NS	NS	NS	NS	NR	NS	NR	NR	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	09/20/11	14.24	3.92	--	--	10.32	ND	ND	ND	ND	ND	NR	ND	ND	ND	NR	ND	NR	NR	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	11/26/12	14.24	3.42	--	--	10.82	ND	ND	ND	ND	ND	NR	ND	ND	ND	NR	ND	NR	NR	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	11/11/13	14.24	Dry				NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
AB-4R	11/14/14	12.05	5.34	--	--	6.71	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
AB-4D	07/25/13	11.81	9.99	--	--	1.82	ND	0.33 J	**6.9**	ND	0.35 J	NR	ND	ND	23.8	ND	ND	**1.5**	NR	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	12/04/13	11.80	9.72	--	--	2.08	ND	ND	**5.8**	ND	ND	ND	ND	ND	18.6	ND	ND	**1.5**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	11/14/14	11.81	10.33	--	--	1.48	ND	ND	ND	ND	ND	ND	ND	ND	0.57 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
AB-5	5/13/02	13.24	5.58	--	--	7.66	ND	ND	NA	ND	NA	NR	ND	ND	ND	NR	NA	NR	NR	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA
	09/01/09	13.24	4.72	--	--	8.52	8.8J	ND	ND	ND	ND	NR	ND	ND	ND	NR	ND	NR	NR	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	09/08/10	13.24	8.03	--	--	5.21	ND	ND	ND	ND	ND	NR	ND	ND	ND	NR	ND	NR	NR	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	09/20/11	13.24	4.42	--	--	8.82	ND	ND	ND	ND	ND	NR	ND	ND	ND	NR	ND	NR	NR	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	11/26/12	13.24	5.30	--	--	7.94	8.7J	ND	ND	ND	ND	NR	ND	ND	ND	NR	ND	NR	NR	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	11/11/13	13.24	8.51	--	--	4.73	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	11/14/14	11.18	6.87	--	--	4.31	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Notes

* Gauging date may not represent actual sample date
GWQS = Ground Water Quality Standard
TOC = Top of Casing
LNAPL = Light Non-Aqueous Phase Liquid
TIC = Tentatively Identified Compound
NCE = No Criterion Established
NR = Not Reported
Values in **bold** indicate an exceedance of the GWQS
-- = Not Applicable
**Prior to the November 2014 event, 1,4-Dioxane was included in the Volatile Organic Compound list

ug/L = micrograms per Liter
NA = Not Analyzed
ND = Not Detected
NM = Not Monitored
NS = Not Sampled
B = Indicates Analyte found in associated method blank
J = Indicates an estimated value
Darkened cell indicates a Reporting Limit higher than the NJDEP GWQS

a = Results are from second run
b = Results are from third run
c = Elevated detection limit due to dilution required for high interfering element
d = Elevated sample detection limit due to difficult sample matrix
e = Elevated detection limit due to dilution required for matrix interference (indicated by failing internal standard on original analysis)
f = Detection limit raised due to dilution required for possible matrix interference
g = Analysis Performed by Accutest Laboratories, Marlborough, MA.
h= This compound in BS is outside in house QC limits bias high
j = Confirmation run
k = There are compounds in BS were ouside in house QC limits. The results confirmed by reextraction outside the holding time.

Table 4
Aeration Basins- Groundwater Summary Data Table
Hess Corporation - Former Port Reading Complex
750 Cliff Road
Port Reading, Middlesex County, New Jersey

Sample ID	Date	Volatile Organic Compounds: Isopropyl benzene	Methyl cyclo hexane	Methyl Tert Butyl Ether (MTBE)	4-Methyl-2-pentanone (MIBK)	Methylene chloride	Tert Butyl Alcohol	Tetra chloro ethene	Toluene	1,2,3-Trichloro benzene	1,2,4-Trichloro benzene	1,1,1-Trichloro ethane	1,1,2-Trichloro ethane	Trichloro ethene	Vinyl chloride	Xylene (total)	Total TIC, Volatile
NJDEP GWQS		**700**	**--**	**70**	**--**	**3**	**100**	**1**	**600**	**--**	**9**	**30**	**3**	**1**	**1**	**1,000**	**100/500**
AB-1	5/13/02	NA	NA	NA	ND	ND	NA	ND	ND	NA	NA	ND	ND	ND	ND	ND	6.3
	09/01/09	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0
	09/08/10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	73 (1) J
	09/20/11	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0
	11/26/12	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0
	11/11/13	ND	ND	ND	ND	ND	ND	0.45 J	ND	ND	ND	ND	ND	ND	ND	ND	0.0
	11/14/14	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0
AB-2	5/13/02	NA	NA	NA	ND	ND	NA	ND	ND	NA	NA	ND	ND	ND	ND	ND	11
AB-2R	09/01/09	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0
	09/08/10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0
	09/20/11	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0
	11/26/12	ND	ND	1.8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0
	11/11/13	ND	ND	0.46 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	7.1 (1) J
	11/14/14	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0
AB-3	5/13/02	NA	NA	NA	ND	ND	NA	ND	ND	NA	NA	ND	ND	ND	ND	11.9	**531**
	09/01/09	2.2	ND	2.6	ND	ND	25.4	ND	ND	ND	ND	ND	ND	ND	ND	0.87 J	12.8 (2) J
	09/08/10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0
	09/20/11	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0
	11/26/12	2.6	ND	9.4	ND	ND	14.1 J	ND	ND	ND	ND	ND	ND	ND	ND	0.41 J	16 (1) J
	11/11/13	ND	ND	8.4	ND	ND	44.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0
	11/14/14	ND	ND	0.92 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0
AB-4	5/13/02	NA	NA	NA	ND	ND	NA	ND	ND	NA	NA	ND	ND	ND	ND	6	92.8
	09/01/09	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0
	09/08/10	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	09/20/11	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0
	11/26/12	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0
	11/11/13	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
AB-4R	11/14/14	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0
AB-4D	07/25/13	ND	ND	0.94 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	**1.8**	ND	ND	0.0
	12/04/13	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**2.8**	ND	ND	0.0
	11/14/14	ND	ND	0.34 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0
AB-5	5/13/02	NA	NA	NA	ND	ND	NA	ND	ND	NA	NA	ND	ND	ND	ND	ND	100
	09/01/09	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0
	09/08/10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0
	09/20/11	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0
	11/26/12	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0
	11/11/13	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0
	11/14/14	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0

Sample ID	Date	Semi-volatile Organic Compounds: Penta chloro phenol	Acenaph thene	Acenaph thylene	Anthracene	Benzo(a) anthracene	Benzo(a) pyrene	Benzo(b) fluoran thene	Benzo(g,h,i) perylene	Benzo(k) fluoran thene	Chrysene	Dibenzo (a,h)anthra cene	Fluoran thene	Fluorene	Hexa chloro benzene
NJDEP GWQS		**0.3**	**400**	**100**	**2,000**	**0.1**	**0.1**	**0.2**	**100**	**0.5**	**5**	**0.3**	**300**	**300**	**0.02**
AB-1	5/13/02	NA	ND	NA	ND	NA	NA	NA	NA	NA	NA	ND	ND	ND	NA
	09/01/09	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	09/08/10	NA	0.165	ND	0.265	**0.295**	ND	ND	ND	ND	0.103	ND	0.389	0.354	ND
	09/20/11	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	11/26/12	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	11/11/13	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	11/14/14	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
AB-2	5/13/02	NA	ND	NA	ND	NA	NA	NA	NA	NA	NA	ND	ND	ND	NA
AB-2R	09/01/09	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	09/08/10	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	09/20/11	NA	0.175	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	11/26/12	ND	4.29	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	11/11/13	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	11/14/14	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
AB-3	5/13/02	NA	13	NA	ND	NA	NA	NA	NA	NA	NA	ND	ND	6.7	NA
	09/01/09	ND	21.2	0.436	0.429	ND	ND	ND	ND	ND	ND	ND	0.591	10.7	ND
	09/08/10	NA	4.59	ND	0.221	ND	ND	ND	ND	ND	ND	ND	0.18	2.01	ND
	09/20/11	NA	6.6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.716	ND
	11/26/12	ND	3.59	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.372	ND
	11/11/13	ND	0.130	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	11/14/14	ND	0.294	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
AB-4	5/13/02	NA	49	NA	0.64	NA	NA	NA	NA	NA	NA	ND	ND	16.9	NA
	09/01/09	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	09/08/10	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	09/20/11	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	11/26/12	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	11/11/13	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
AB-4R	11/14/14	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
AB-4D	07/25/13	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	12/04/13	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	11/14/14	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
AB-5	5/13/02	NA	ND	NA	ND	NA	NA	NA	NA	NA	NA	ND	ND	ND	NA
	09/01/09	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	09/08/10	NA	ND	ND	0.193	**0.304**	ND	ND	ND	ND	0.113	ND	0.269	0.172	ND
	09/20/11	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	11/26/12	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	11/11/13	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	11/14/14	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Notes

* Gauging date may not represent actual sample date
GWQS = Ground Water Quality Standard
TOC = Top of Casing
LNAPL = Light Non-Aqueous Phase Liquid
TIC = Tentatively Identified Compound
NCE = No Criterion Established
NR = Not Reported
Values in **bold** indicate an exceedance of the GWQS
-- = Not Applicable
**Prior to the November 2014 event, 1,4-Dioxane was included in the Volatile Organic Compound list

ug/L = micrograms per Liter
NA = Not Analyzed
ND = Not Detected
NM = Not Monitored
NS = Not Sampled
B = Indicates Analyte found in associated method blank
J = Indicates an estimated value
Darkened cell indicates a Reporting Limit higher than the NJDEP GWQS

a = Results are from second run
b = Results are from third run
c = Elevated detection limit due to dilution required for high interfering element
d = Elevated sample detection limit due to difficult sample matrix
e = Elevated detection limit due to dilution required for matrix interference (indicated by failing internal standard on original analysis)
f = Detection limit raised due to dilution required for possible matrix interference
g = Analysis Performed by Accutest Laboratories, Marlborough, MA.
h= This compound in BS is outside in house QC limits bias high
j = Confirmation run
k = There are compounds in BS were ouside in house QC limits. The results confirmed by reextraction outside the holding time.

Sample ID	Date	Semi- Volatile Organic Compounds																																
		Indeno (1,2,3-cd) pyrene	Naphthalene	Phenanthrene	Pyrene	2-Chloro phenol	4-Chloro-3-methyl phenol	2,4-Dichlorophenol	2,4-Dimethyl phenol	2-Methyl phenol	3&4-Methyl phenol	Phenol	2,4,5-Trichloro phenol	2,4,6-Trichloro phenol	Acetophenone	Benz aldehyde	Butyl benzyl phthalate	1,1-Biphenyl	4-Chloro aniline	Carbazole	Caprolactam	3,3-Dichloro benzidine	Dibenzofuran	Di-n-butyl phthalate	Di-n-octyl phthalate	Diethyl phthalate	Dimethyl phthalate	**1,4-Dioxane	bis(2-Ethylhexyl) phthalate	Isophorone	2-Methyl naphthalene	4-Nitro aniline	1,2,4,5 Tetra chloro benzene	Total TIC, Semi-Volatile
NJDEP GWQS		**0.2**	**300**	**100**	**200**	**40**	**--**	**20**	**100**	**--**	**--**	**2,000**	**700**	**20**	**700**	**--**	**100**	**400**	**30**	**--**	**3,500**	**30**	**--**	**--**	**100**	**6,000**	**100**	**10**	**3**	**40**	**30**	**--**	**--**	**100/500**
AB-1	5/13/02	NA	ND	ND	ND	NA	NA	NR	ND	ND	ND	ND	NA	NA	NA	NA	ND	NA	ND	ND	NA	NA	ND	ND	ND	ND	NA	NA	1	NA	ND	NA	NA	35.1
	09/01/09	ND	ND	ND	ND	ND	ND	NR	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**165**[a]	ND	ND	ND	ND	0.0
	09/08/10	ND	ND	1.54	0.375	NA	NA	NR	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**5.2**	ND	ND	ND	ND	0.0
	09/20/11	ND	ND	ND	ND	NA	NA	NR	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0
	11/26/12	ND	ND	ND	ND	ND	ND	NR	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**4.6**	ND	ND	ND	ND	37.1 (4) J
	11/11/13	ND	ND	ND	ND	ND	ND	NR	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0
	11/14/14	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	19.1 B	ND	ND	ND	ND	1.7 J	ND	ND	ND	ND	38.3 J (3)
AB-2	5/13/02	NA	ND	ND	ND	NA	NA	NR	ND	ND	ND	ND	NA	NA	NA	NA	ND	NA	ND	ND	NA	NA	ND	ND	ND	ND	NA	NA	ND	NA	ND	NA	NA	0.0
AB-2R	09/01/09	ND	ND	ND	ND	ND	ND	NR	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.1 J	ND	ND	ND	ND	6 (1) J
	09/08/10	ND	ND	ND	ND	NA	NA	NR	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0
	09/20/11	ND	ND	ND	ND	NA	NA	NR	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0
	11/26/12	ND	ND	ND	0.166	ND	ND	NR	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.63 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	26.2 (2) J
	11/11/13	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	105.2 (3) J
	11/14/14	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	9.0 B	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.6 J (1)
AB-3	5/13/02	NA	52.7	5.4	ND	NA	NA	NR	ND	ND	ND	ND	NA	NA	NA	NA	ND	NA	ND	2.7	NA	NA	ND	1	ND	ND	NA	NA	ND	NA	**50.1**	NA	NA	367.3
	09/01/09	ND	0.287	0.503	0.316	ND	ND	NR	ND	ND	ND	0.591	ND	**21.2**	ND	0.287	ND	ND	ND	6.1	ND	ND	11.4	ND	ND	ND	ND	ND	**45.6**	ND	ND	ND	ND	212.8 (18) J
	09/08/10	ND	ND	0.223	0.188	NA	NA	NR	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	1.7 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	50.2 (3) J
	09/20/11	ND	ND	ND	ND	NA	NA	NR	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	2.9 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	24.6 (4) J
	11/26/12	ND	ND	ND	ND	ND	ND	NR	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.79 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	73 (3) J
	11/11/13	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	35.6 (3) J
	11/14/14	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	7.7 B	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0
AB-4	5/13/02	NA	141	8	ND	NA	NA	NR	2	ND	0.84	ND	NA	NA	NA	NA	ND	NA	ND	10.7	NA	NA	7.6	ND	ND	ND	NA	NA	ND	NA	**67.5**	NA	NA	278.1
	09/01/09	ND	ND	ND	ND	ND	ND	NR	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**8.9**	ND	ND	ND	ND	0.0
	09/08/10	NS	NS	NS	NS	NS	NS	NR	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	09/20/11	ND	ND	ND	ND	NA	NA	NR	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0
	11/26/12	ND	ND	ND	ND	ND	ND	NR	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	35 (1) J
	11/11/13	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
AB-4R	11/14/14	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	7.5 B	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0
AB-4D	07/25/13	ND	ND	ND	ND	ND	ND	NR	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.0 J	ND	ND	ND	ND	0.0
	12/04/13	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0
	11/14/14	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.5 B	ND	ND	ND	ND	ND	ND	ND	ND	ND	12.0 (1) J
AB-5	5/13/02	NA	ND	1.2	ND	NA	NA	NR	ND	ND	ND	ND	NA	NA	NA	NA	ND	NA	ND	ND	NA	NA	22.8	ND	ND	ND	NA	NA	ND	NA	ND	NA	NA	65.8
	09/01/09	ND	ND	ND	ND	ND	ND	NR	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**94.3**	ND	ND	ND	ND	39 (2) J
	09/08/10	ND	ND	0.726	0.302	NA	NA	NR	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0
	09/20/11	ND	ND	ND	ND	NA	NA	NR	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**6.0**	ND	ND	ND	ND	0.0
	11/26/12	ND	ND	ND	ND	ND	ND	NR	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	111 (2) J
	11/11/13	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	4.5 (1) J
	11/14/14	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.9 B	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0

Notes

* Gauging date may not represent actual sample date		ug/L =	micrograms per Liter	a =	Results are from second run
GWQS =	Ground Water Quality Standard	NA =	Not Analyzed	b =	Results are from third run
TOC =	Top of Casing	ND =	Not Detected	c =	Elevated detection limit due to dilution required for high interfering element
LNAPL =	Light Non-Aqueous Phase Liquid	NM =	Not Monitored	d =	Elevated sample detection limit due to difficult sample matrix
TIC =	Tentatively Identified Compound	NS =	Not Sampled	e =	Elevated detection limit due to dilution required for matrix interference (indicated by failing internal standard on original analysis)
NCE =	No Criterion Established	B =	Indicates Analyte found in associated method blank	f =	Detection limit raised due to dilution required for possible matrix interference
NR =	Not Reported	J =	Indicates an estimated value	g =	Analysis Performed by Accutest Laboratories, Marlborough, MA.
Values in **bold** indicate an exceedance of the GWQS		Darkened cell indicates a Reporting Limit higher than the NJDEP GWQS		h=	This compound in BS is outside in house QC limits bias high
-- =	Not Applicable			j =	Confirmation run
**Prior to the November 2014 event, 1,4-Dioxane was included in the Volatile Organic Compound list				k =	There are compounds in BS were ouside in house QC limits. The results confirmed by reextraction outside the holding time.

Table 4
Aeration Basins- Groundwater Summary Data Table
Hess Corporation - Former Port Reading Complex
750 Cliff Road
Port Reading, Middlesex County, New Jersey

		General Chemistry				Pesticides			Metals																						
Sample ID	Date	Ammonia	Chloride	Cyanide	Total Dissolved Solids (TDS)	alpha-Chlordane	Heptachlor epoxide	4,4'-DDD	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
NJDEP GWQS		3,000	250,000	100	500,000	0.5	0.2	0.1	200	6	3	6,000	1	4	--	70	100	1,300	300	5	--	50	2	100	--	40	40	50,000	2	--	2,000
AB-1	5/13/02	NA	NA	NA	NA	NA	NA	NA	**2,050**	<5.0	**7.7**	<200	NA	NA	78,300	<10	NA	<25	**6,430**	3.9	25,100	**205**	<0.20	NA	115,000	<5.0	NA	**321,000**	NA	<50	30.2
	09/01/09	NA	NA	<0.01	NA	ND	ND	ND	**11,700**	<6.0	**14.6**	<200	<1.0	<3.0	22,300	11.9	<50	34	**5,830**	**21**	<5,000	23.5	<0.20	<10	17,500	<10	<10	15,400	<2.0	<50	61.8
	09/08/10	NA	NA	NA	NA	NA	NA	NA	**43,500[d]**	<12[d]	**70.2[d]**	<400[d]	**2.8[d]**	<6.0[d]	45,000[d]	**98.4[d]**	<100[d]	92.4[d]	**30,600[d]**	**66[d]**	13,800[d]	**119[d]**	<0.20	51.2[d]	39,000[d]	<20[d]	<20[d]	31,600[d]	<4.0[d]	103[d]	248[d]
	09/20/11	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11/26/12	<200	NA	NA	NA	NA	NA	NA	**672**	<6.0	**3.3**	<200	<1.0	<3.0	84,700	<10	<50	<10	116	<3.0	16,500	<15	<0.20	<10	19,500	<10	<10	**173,000**	<2.0	<50	<20
	11/11/13	<200	NA	NA	NA	NA	NA	NA	**7,460[g]**	<6.0[g]	**21.4[g]**	63.2[g]	<1.0[g]	<4.0[g]	40,600[g]	17.8[g]	<50[g]	<25[g]	**22,900[g]**	**17.2[g]**	7,520[g]	**83.5[g]**	<0.20[g]	<40[g]	37,300[g]	<10[g]	<5.0[g]	**131,000[g]**	<2.0[g]	64.7[g]	50.4[g]
	11/14/14	<200	NA	NA	NA	NA	NA	NA	**5,410**	<6.0	**16.0**	<200	<1.0	<3.0	23,000	10.3	<50	10.8	**11,800**	**10.7**	5,550	29.0	<0.20	<10	12,900	<10	<10	39,700	<2.0	70.6	34.3
AB-2	5/13/02	NA	NA	NA	NA	NA	NA	NA	**4,850**	<5.0	**8.4**	<200	NA	NA	61,100	<10	NA	<25	**16,900**	**11.7**	58,900	**725**	<0.20	NA	21,000	<5.0	NA	**431,000**	NA	<50	50.8
AB-2R	09/01/09	NA	NA	<0.01	NA	ND	ND	ND	**921**	<6.0	**14.3**	226	<1.0	<3.0	25,200	<10	<50	21.3	**30,600**	4.5	19,700	**141**	<0.20	<10	13,700	<10	<10	**292,000**	<2.0	<50	25.5
	09/08/10	NA	NA	NA	NA	NA	NA	NA	**5,990**	<6.0	**5.9**	<200	<1.0	<3.0	11,800	11.7	<50	30.8	**24,400**	**11.2**	10,700	**454**	<0.20	<10	11,600	<10	<10	**115,000**	<2.0	<50	29.9
	09/20/11	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11/26/12	2,700	NA	NA	NA	NA	NA	NA	<200	<6.0	<3.0	<200	<1.0	<3.0	95,300	<10	<50	<10	**9,940**	<3.0	132,000	**452**	<0.20	<10	56,700	<10	<10	**1,760,000**	<2.0	<50	<20
	11/11/13	**7,700**	NA	NA	NA	NA	NA	NA	**6,870[g]**	<6.0[g]	**6.6[g]**	570[g]	<1.0[g]	**29.6[g]**	176,000[g]	<10[g]	<50[g]	39.5[g]	**7,820[g]**	**25.0[g]**	189,000[g]	**881[g]**	<0.20[g]	<40[g]	79,200[g]	<10[g]	<5.0[g]	**2,070,000[g]**	<2.0[g]	15.8[g]	37.3[g]
	11/14/14	960	NA	NA	NA	NA	NA	NA	**521**	<6.0	<3.0	239	<1.0	<3.0	129,000	<10	<50	<10	**1,700**	3.2	34,000	**337**	<0.20	<10	20,900	<10	<10	**662,000**	<2.0	<50	<20
AB-3	5/13/02	NA	NA	NA	NA	NA	NA	NA	**7,490**	<5.0	**20.3**	<200	NA	NA	43,300	16.9	NA	<25	**100,000**	**10.7**	57,700	**479**	<0.20	NA	26,900	<5.0	NA	**340,000**	NA	<50	35.8
	09/01/09	NA	NA	<0.01	NA	ND	ND	ND	**561**	**8.5**	**32.3**	216	<1.0	**4.7**	109,000	<10	<50	10.7	**114,000**	4.4	183,000	**364**	<0.20	<10	81,100	<10	<10	**1,070,000**	<4.0	<50	<20
	09/08/10	NA	NA	NA	NA	NA	NA	NA	**303**	<6.0	**5.1**	<200	<1.0	<3.0	122,000	<10	<50	17.5	**82,700**	<3.0	72,000	**3,590**	<0.20	<10	154,000	<10	<10	**1,150,000**	<2.0	<50	37.5
	09/20/11	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11/26/12	**3,400**	NA	NA	NA	NA	NA	NA	<200	<6.0	<3.0	<200	<1.0	<3.0	29,700	<10	<50	<10	**3,350**	<3.0	15,800	**160**	<0.20	<10	175,000	<10	<10	**149,000**	<2.0	<50	<20
	11/11/13	**9,100**	NA	NA	NA	NA	NA	NA	**365[g]**	<6.0[g]	**5.8[g]**	106[g]	<1.0[g]	<4.0[g]	216,000[g]	<10[g]	<50[g]	<25[g]	**42,100[g]**	<5.0[g]	200,000[g]	**1,440[g]**	<0.20[g]	<40[g]	497,000[g]	<10[g]	<5.0[g]	**3,190,000[g]**	<2.0[g]	<10[g]	<20[g]
	11/14/14	490	NA	NA	NA	NA	NA	NA	**215**	<6.0	<3.0	<200	<1.0	<3.0	16,100	<10	<50	<10	**5,780**	<3.0	5,270	**115**	<0.20	<10	33,300	<10	<10	**112,000**	<2.0	<50	<20
AB-4	5/13/02	NA	NA	NA	NA	NA	NA	NA	**7,360**	<5.0	**17**	597	NA	NA	52,700	10.3	NA	<25	**16,200**	**10.2**	98,100	**212**	0.2	NA	25,400	<5.0	NA	**409,000**	NA	<50	26.2
	09/01/09	NA	NA	<0.01	NA	ND	ND	ND	**5,200**	<6.0	<3.0	<200	<1.0	<3.0	85,900	<10	<50	10.4	**2,370**	**8.3**	6,600	**362**	<0.20	**115**	68,000	<10	<10	**296,000**	<2.0	<50	528
	09/08/10	NS	NA	NS	NA	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	09/20/11	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11/26/12	<200	NA	NA	NA	NA	NA	NA	**1,730**	<6.0	<3.0	<200	<1.0	**6.4**	183,000	<10	<50	12	**3,320**	<3.0	19,500	**499**	<0.20	24.5	82,500	<10	<10	**91,700**	<2.0	<50	139
	11/11/13	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
AB-4R	11/14/14	<200	NA	NA	NA	NA	NA	NA	**235**	<6.0	**18.3**	<200	<1.0	<3.0	46,000	<10	<50	<10	**4,050**	<9.0[c]	<5,000	**57.7**	<0.20	<10	63,400	<10	<10	**292,000**	<6.0[c]	<50	27.6
AB-4D	07/25/13	1,400	NA	NA	NA	NA	NA	NA	**377**	<6.0	**4.1**	<200	<1.0	<3.0	26,900	<10	<50	<10	**459**	<3.0	14,200	44.6	<0.20	<10	15,500	<10	<10	**105,000**	<2.0	<50	<20
	12/04/13	250	188,000	NA	433,000	NA	NA	NA	<200[g]	<6.0[g]	**3.7[g]**	<50[g]	<1.0[g]	<4.0[g]	30,600[g]	<10[g]	<50[g]	<25[g]	145[g]	<5.0[g]	18,400[g]	<15[g]	<0.20[g]	<40[g]	15,800[g]	<10[g]	<5.0[g]	**142,000[g]**	<2.0[g]	18.3[g]	<20[g]
	11/14/14	<200	NA	NA	NA	NA	NA	NA	**246**	<6.0	**7.2**	<200	<1.0	<3.0	41,300	<10	<50	<10	239	<3.0	56,400	<15	<0.20	<10	39,900	<10	<10	**503,000**	<2.0	<50	<20
AB-5	5/13/02	NA	NA	NA	NA	NA	NA	NA	**2,880**	<5.0	**10.4**	<200	NA	NA	146,000	<10	NA	<25	**39,700**	4.9	49,800	**879**	<0.20	NA	188,000	<5.0	NA	**822,000**	NA	<50	28.2
	09/01/09	NA	NA	<0.01	NA	ND	ND	ND	**283**	<6.0	<3.0	<200	<1.0	<3.0	23,800	<10	<50	<10	**4,600**	4.1	<5,000	38.8	<0.20	<10	<10,000	<10	<10	<10,000	<2.0	<50	<20
	09/08/10	NA	NA	NA	NA	NA	NA	NA	**1,300**	<6.0	**8.2**	<200	<1.0	<3.0	34,800	<10	<50	53.9	**7,540**	**6**	<5,000	35.8	<0.20	<10	<10,000	<10	<10	12,700	<2.0	<50	26.6
	09/20/11	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	11/26/12	320	NA	NA	NA	NA	NA	NA	<200	<6.0	**3**	<200	<1.0	<3.0	75,300	<10	<50	<10	**8,680**	<3.0	28,100	**202**	<0.20	<10	15,700	<10	<10	**85,300**	<2.0	<50	<20
	11/11/13	2,500	NA	NA	NA	NA	NA	NA	**566[g]**	<6.0[g]	<3.0[g]	58.8[g]	<1.0[g]	<4.0[g]	50,800[g]	<10[g]	<50[g]	<25[g]	**7,250[g]**	<5.0[g]	8,160[g]	**190[g]**	<0.20[g]	<40[g]	8,260[g]	<10[g]	<5.0[g]	**78,000[g]**	<2.0[g]	<10[g]	23.7[g]
	11/14/14	520	NA	NA	NA	NA	NA	NA	**638**	<6.0	<3.0	<200	<1.0	<3.0	18,200	<10	<50	26.8	**1,280**	5.6	<5,000	18.4	<0.20	<10	<10,000	<10	<10	**14,600**	<2.0	<50	39.3

Notes
* Gauging date may not represent actual sample date
GWQS = Ground Water Quality Standard
TOC = Top of Casing
LNAPL = Light Non-Aqueous Phase Liquid
TIC = Tentatively Identified Compound
NCE = No Criterion Established
NR = Not Reported
Values in **bold** indicate an exceedance of the GWQS
-- = Not Applicable
**Prior to the November 2014 event, 1,4-Dioxane was included in the Volatile Organic Compound list

ug/L = micrograms per Liter
NA = Not Analyzed
ND = Not Detected
NM = Not Monitored
NS = Not Sampled
B = Indicates Analyte found in associated method blank
J = Indicates an estimated value
Darkened cell indicates a Reporting Limit higher than the NJDEP GWQS

a = Results are from second run
b = Results are from third run
c = Elevated detection limit due to dilution required for high interfering element
d = Elevated sample detection limit due to difficult sample matrix
e = Elevated detection limit due to dilution required for matrix interference (indicated by failing internal standard on original analysis)
f = Detection limit raised due to dilution required for possible matrix interference
g = Analysis Performed by Accutest Laboratories, Marlborough, MA.
h= This compound in BS is outside in house QC limits bias high
j = Confirmation run
k = There are compounds in BS were ouside in house QC limits. The results confirmed by reextraction outside the holding time.

APPENDIX I

New Jersey Pollutant Discharge and Elimination System Permit

IN

1988 APR -8 P 1:24

State of New Jersey
PORT READING

DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF WATER RESOURCES

CN 029
TRENTON, NEW JERSEY 08625

GEORGE G. McCANN, P.E.
DIRECTOR

DIRK C. HOFMAN, P.E.
DEPUTY DIRECTOR

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

MAR 31 1988

John Steinhauer
Refinery Manager
Amerada Hess (Port Reading) Corporation
750 Cliff Road
Port Reading, NJ 07064

Dear Mr. Steinhauer:

Re: Final Resource Conservation and Recovery Act (RCRA) Industrial Waste Management Facility (IWMF) Operating Permit NJPDES No. NJ0028878 (EPA ID NJD045445483)

Enclosed is the final Industrial Waste Management Facility (IWMF) Operating Permit that has been issued in pursuant to N.J.A.C. 7:14A-1 et seq. and N.J.A.C. 7:26-1 et seq. This final document is being issued to permit the operation of the No. 1 Land Treatment Unit (Landfarm) within the limits set forth in the attached conditions.

This final permit is issued in accordance with the New Jersey Pollutant Discharge Elimination System Regulations, N.J.A.C. 7:14A-1 et seq. and the New Jersey Hazardous Waste Regulations, N.J.A.C. 7:26-1 et seq. and you are required to comply with the terms and conditions of this permit. Please be advised that failure to meet any and all conditions of this permit can result in the imposition of substantial administrative, civil, and criminal penalties. The Effective Date of the Permit (EDP) is thirty (30) days after the permit is issued final.

The following are responses to comments made by Amerada Hess (Port Reading) Corporation (hereinafter referred to as "Hess") or The Advent Group, Inc. (technical consultant to Hess, hereinafter referred to as "Advent"). The responses are numbered according to the permit condition number referenced in the comment. Only those conditions upon which Hess or Advent commented are included. "Acknowledged" signifies that the Department concurred with the comment and has modified the condition in question.

PUBLIC NOTICE

Any suggested corrections made by Hess or Advent to these pages have been noted, but will not be made to the final permit since the Public Notice is a part of the permit drafting procedure and is not part of a final permit.

FACT SHEET

Several changes in the Fact Sheet have been made that are consistent with other changes suggested by Hess or Advent.

PERMIT PAGE

All three addresses on the permit page are now the same.

GENERAL CONDITIONS

Grammatical changes have been made throughout as marked.

1.A

Acknowledged. The language of the permit has been changed.

10.

The language of this section has been changed as suggested by Hess and is also acceptable to the Department.

11.C

Acknowledged. Analytical testing must be in accordance with the most recent edition of SW-846 or other USEPA-approved procedures.

11.D

Records of all monitoring information must be kept at the facility for the active life of the facility and any closure/post-closure periods.

11.H

Acknowledged. Hess has up to sixty (60) days to submit monitoring information.

11.I

Acknowledged. The paragraph has been clarified.

SPECIAL CONDITIONS

All references to the North Landfarm have been deleted because the LTD did not prove that effective treatment and safe operation of the North Landfarm was possible. **The North Landfarm is not** permitted to receive any waste and the closure plan must be submitted within thirty (30) days of the EDP.

1\.

Acknowledged.

2\.a

The average oil and grease (total petroleum product) content of landfarm soils in the zone of incorporation shall not exceed 6% on a dry weight basis.

2\.e

The Department agrees that wastes may be applied throughout the year (at a reduced rate from October through April) but shall <u>not</u> be applied when:

1) Average daily temperatures are not projected above 32° Fahrenheit for the 24 hour day;

2) Rainfall is occurring or forecast within 24 hours;

3) Standing water is present on the landfarm surface; or,

4) The landfarm surface is frozen.

3\.

Acknowledged. The discharge to surface water permit is independent of this permit. However, each permit is subject to review and modification by the Department throughout the period during which the permit remains effective.

4\.

No wastes from sources other than Amerada Hess Corporation within the State of New Jersey are permitted to be applied to the landfarm. Waste types X-722 and X-728 are therefore not permitted to be applied to the landfarm <u>unless</u> they are generated by Hess within the State of New Jersey.

The following sludges are permitted to be applied to the landfarm:

1) waste types K-049, K-050, K-051, X-722, X-728, non-hazardous biomass; and,

2) waste types K-052, P-110, and oil-contaminated soils (from Hess closure activities) upon receipt of written approval from the Department.

All wastes applied to the landfarm must be analyzed annually to recharacterize the waste that is to be applied to the landfarm.

5.

This recharacterization plan is to include an outline and description of information to be submitted with each future (annual) analysis (recharacterization) of waste conducted by Hess or its contractor.

Schedules for waste generation and leachate removal shall be included in the plan. These schedules must be updated upon implementation of any change in either activity.

5.a

The annual sampling and analysis of waste shall occur in July of each year. The results must reported to the Department within sixty (60) days of the sampling date. Waste not available for sampling and analysis in July must be sampled and analyzed as soon as possible. The results of these analyses must be reported to the Department thirty days prior to application of the waste to the landfarm.

5.b

In the event that the mass of any constituent in the leachate exceeds 1% of the mass of that constituent applied to the landfarm, a study of the management techniques shall be performed. This study shall include respirometer and field testing for evaluation of pretreatment, or other management techniques to increase the efficiency of the landfarm. This study shall be submitted to the Department within 90 days of the exceedance of 1% of the applied mass in the leachate and shall propose improved management techniques. The best alternative will be chosen by the Department after in-depth review and discussions with Hess and its consultants. All foreseeable alternatives should be clearly described and outlined in the plan.

5.c and d

Personnel evaluations are not necessary, however personnel qualifications are required.

8.a

Acknowledged, the permit has been modified to reflect the inclusion of the replacement well.

8.g

The Department agrees with Hess that appropriate statistical tools should be used provided that proper justification and documentation are also given for their use. A statistical method based on the proposed trigger values shall be used. Hess may request a modification of this method upon submittal of a valid alternative method.

9.a

Acknowledged.

9.b

Acknowledged

11.c

Acknowledged.

13.

Acknowledged.

14.

Acknowledged.

16.

Acknowledged.

18.c

N.J.A.C. 7:26-9.10(e)4 requires that the closure cost estimate be kept at the facility during the operating life of the facility.

18.g

Acknowledged.

Any request for an adjudicatory hearing to reconsider or contest the conditions of this permit must be made within thirty (30) calendar days following your receipt of this permit. The request should be made to:

Administrator
NJDEP Division of Water Resources
Ground Water Quality Management Element
CN-029
Trenton, New Jersey 08625

If you have any questions on this document, please contact Henry Schuver of the Bureau of Ground Water Quality Control at (609) 292-8427.

Sincerely,

Arnold Schiffman, Assistant Director
Ground Water Quality Management

Enclosures

FACT SHEET
for RCRA-NJPDES/IWMF Operating Permit
for Hazardous Waste Land Treatment Unit

NAME AND ADDRESS OF APPLICANT:

Amerada Hess (Port Reading) Corporation
One Hess Plaza
Woodbridge, New Jersey 07095

NAME AND ADDRESS OF FACILITY WHERE DISCHARGE OCCURS:

Amerada Hess (Port Reading) Corporation
750 Cliff Road
Port Reading
Woodbridge, New Jersey 07064

RECEIVING WATER:

Ground Water of the State. The Amerada Hess (Port Reading) Corporation Refinery overlies the Brunswick Shale Formation of Triassic Age. The site is underlain by river deposits of clay and fine sand, and part of the site is reclaimed tidal marsh.

LOCATION OF DISCHARGE:

The Amerada Hess (Port Reading) Corporation Refinery and its terminal are located off Cliff Road in Port Reading, New Jersey. The site consists of Lot 3, Block 756; Lot 1, Block 757; Lot 1B, Block 757; Lot 6, Block 760; Lot 1, Block 760B; Lot 2, Block 760B; Lot 3, Block 760B; Lot 6, Block 1095.

DESCRIPTION OF THE FACILITY:

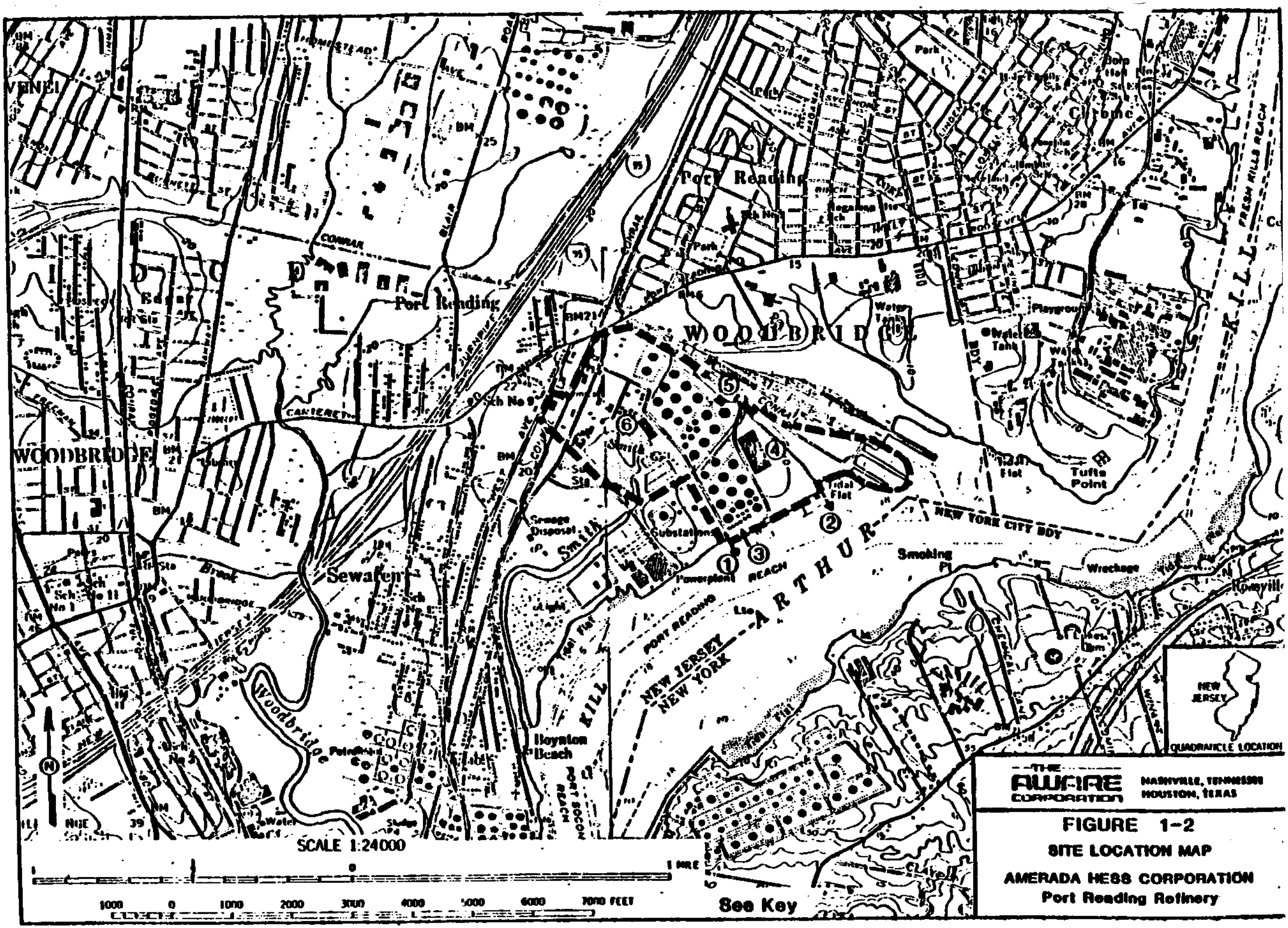
The Amerada Hess (Port Reading) Corporation Refinery and Terminal is an existing petroleum products storage and distribution facility. The refinery accepts low-sulfur crude oil from tanker ships and, via a catalytic cracker and processing, produces gasoline, fuel oil and other petroleum products.

DESCRIPTION OF DISCHARGE:

The Amerada Hess (Port Reading) Corporation shall operate the No. 1 landfarm for the degradation of oily wastes such as API separator sludge, oily solids, heat exchanger sludge and tank bottoms. These waste will be biologically broken down when tilled into the soil. A pH at or above 6.5 shall be maintained to prevent movement of metals through the soil. The landfarms are designed to minimize discharges to the ground water. One hundred percent degredation is not obtainable due to natural conditions (precipitation forces some constituents through the treatment zone prior to complete degredation). Ninety nine percent degredation of organic compounds will be achieved within the landfarm. The leachate (less than 1 percent of the applied mass) is contained in a leachate collection system above a 1 foot thick compacted clay liner and treated in the on-site permitted Advanced Waste Water Treatment Plant.

PERMIT CONDITION:

An interim New Jersey Pollutant Discharge Elimination System/IWMF Permit to discharge to ground waters shall be issued with the following conditions. This permit shall only apply to the No. 1 landfarm (Land Treatment Unit).



THE AWARE CORPORATION NASHVILLE, TENNESSEE HOUSTON, TEXAS

FIGURE 1-2

SITE LOCATION MAP

AMERADA HESS CORPORATION

Port Reading Refinery

New Jersey Pollutant Discharge Elimination System

The New Jersey Department of Environmental Protection hereby restricts and controls the discharge of pollutants to waters of the State from the subject facility/activity in accordance with applicable laws and regulations. The permittee is responsible for complying with all terms and conditions of this authorization and agrees to said terms and conditions as a requirement for the construction, installation, modification or operation of any facility for the collection, treatment or discharge of any pollutant to waters of the State.

PERMIT NUMBER NJ0028878

Permittee	Co-Permittee
AMERADA HESS PORT READING CORPORATION 750 CLIFF ROAD WOODBRIDGE, NJ 07095	

Property Owner	Location of Activity
AMERADA HESS (PORT READING) CORPORATION 750 CLIFF RD. PORT READING, NJ 07064	AMARADA HESS PORT READING CORPORATION 750 CLIFF ROAD PORT READING, NJ 07064

Type of Permit Covered By This Approval	Issuance Date	Effective Date	Expiration Date
B :Ind/Comm.SW Discharge	12/15/84	3/15/85	3/14/88
E :Land App/Ind. Waste Residuals	3/31/88	5/01/88	4/30/93

By Authority of:
George G. McCann, P.E.

DEP AUTHORIZATION

(Terms, conditions and provisions attached hereto)

State of New Jersey Department of Environmental Protection/Division of Water Resources

CHECKLIST OF PARTS AND MODULES COMPRISING THIS NJPDES PERMIT

1. Cover Page

2. Checklist

3. Part I (General Conditions for All NJPDES Discharge Permits)

4. Part II - Additional General Conditions for the types of NJPDES Permits checked as follows:

   ____ Part II - A (Municipal/Sanitary)

   ____ Part II - B/C (Industrial/Commercial/Thermal)

   ____ Part II - L (SIU)

   ____ Part II - IWMF (Industrial Waste Management Facility)

   ____ Part II - DGW Specify type(s): ____________

5. Part III - Effluent Limitations and Monitoring Requirements

   ____ Part III - A

   ____ Part III - B/C

   ____ Part III - L

   __X__ Part III - DGW Specify type(s): ____________

6. Part IV - Special Conditions

   ____ Part IV - A

   ____ Part IV - B/C

   ____ Part IV - L

   __X__ Part IV - IWMF

   ____ Part IV - DGW

STATE OF NEW JERSEY
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF WATER RESOURCES

GENERAL CONDITIONS FOR RCRA-IWMF OPERATING PERMIT

1. Duty to Comply

A. The permittee shall comply with all General Conditions of this New Jersey Pollutant Discharge Elimination System (NJPDES) permit, except where: 1) these General Conditions are superceded by the terms of the Special Conditions or any documents incorporated by reference in the Special Conditions; and, 2) the terms of the General Conditions are not applicable to the landfarm operation.

No pollutant shall be discharged more frequently than authorized or at a level in excess of that which is authorized by the permit. The discharge of any pollutant not specifically authorized in the NJPDES permit or listed and quantified in the NJPDES application shall constitute a violation of the permit, unless the permittee can prove by clear and convincing evidence that the discharge of the unauthorized pollutant did not result from any of the permittee's activities which contribute to the generation of its wastewaters. The permittee need not comply with the conditions of this permit only to the extent and for the duration such compliance is authorized in an emergency permit (see N.J.A.C. 7:14A-2.2). Any permit noncompliance constitutes a violation of the New Jersey Pollution Control Act (N.J.S.A. 58:10A-1 et seq.; hereinafter referred to as the State Act) or other authority of the NJPDES regulations (N.J.A.C. 7:14A-1 et seq.) and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or for denial of a permit renewal application.

B. A permittee shall not achieve any effluent concentration by dilution. Nor shall a permittee increase the use of process water or cooling water or otherwise attempt to dilute a discharge as a partial or complete substitute for adequate treatment to achieve permit limitations or water quality standards.

C. The permittee shall comply with applicable standards or prohibitions established under Section 307 (a) of the "Federal Water Pollution Control Act" (PL 92-500 et seq.; hereinafter referred to as the Federal Act) and Section 4 of the State Act for toxic pollutants within the time provided in the regulations that establish these standards or prohibitions, even if the permit has not yet been modified to incorporate the requirement.

D. The State Act provides that any person who violates a permit condition implementing the State Act is subject to a civil penalty not to exceed $10,000 per day of such violation. Any person who willfully or negligently violates permit conditions implementing the State Act is subject to a fine of not less than $2,500 nor more than $25,000 per day of violation, or by imprisonment for not more than 1 year, or both.

E. The permittee is required to comply with all other applicable federal, state and local rules, regulations, or ordinances. The issuance of this permit shall not be considered as a waiver of any other requirements.

2. Permit Expiration

This permit and the authorization to discharge shall expire at midnight on the expiration date of the permit. The permittee shall not discharge after the above date of expiration of the permit.

A. Duty to Reapply. If the permittee wishes to continue an activity regulated by a NJPDES permit after the expiration date of the permit, the permittee shall apply for and obtain a new permit. (If the activity is to be continued, the permittee shall complete, sign, and submit such information, forms, and fees as are required by the Department no later than 180 days before the expiration date.) The permittee shall follow the requirements stated in paragraph 12.A when signing any application.

B. Continuation of Expiring Permits

(1) The conditions of an expired permit are continued in force pursuant to the "Administrative Procedure Act," N.J.S.A. 52:14B-11. until the effective date of a new permit if:

a. The permittee has submitted a timely and complete application for renewal as provided in Sections

2.1, 4.4, and applicable sections of Subchapter 10 of the NJPDES Regulations; and

b. The Department through no fault of the permittee, does not issue a new permit with an effective date under Section 8.6 of the NJPDES Regulations on or before the expiration date of the previous permit (e.g., when issuance is impracticable due to time or resource constraints).

(2) Permits continued under this section remain fully effective and enforceable.

(3) Enforcement. When the permittee is not in complance with the conditions of the expiring or expired permit the Department may choose to do any or all of the following:

a. Initiate enforcement action based upon the permit which has been continued;

b. Issue a notice of intent to deny the new permit under Section 8.1 of the NJPDES Regulations. IF the permit is denied, the owner or operator would then be required to cease the activities authorized by the continued permit or be subject to enforcement action for operating without a permit;

c. Issue a new permit under Subchapters 7 and 8 of the NJPDES Regulations with appropriate conditions; or

d. Take other actions authorized by the NJPDES Regulations or the State Act.

3. Duty to Halt or Reduce Activity

A. It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

B. Upon reduction, loss, or failure of the treatment facility, the permittee shall, to the extent necessary to maintain compliance with the permit, control production or discharges or both until the facility is restored to its permitted limits or an alternative method of treatment is provided. This requirement applies, for example, when the primary source of power of the treatment facility fails or is reduced or lost.

4. Duty to Mitigate

The permittee shall take all reasonable steps to mimimize or correct any adverse impact on the environment resulting from noncompliance with this permit, including but nor limited to accelerated and/or additional types of monitoring, temporary repairs or other mitigating measures.

5. Proper Operation, Maintenance and Licensing

A. The permittee shall at all times maintain in good working order and operate as efficiently as possible all treatment works, facilities, and systems of treatment and control (and related appurtenances) for collection and treatment which are installed or used by the permittee for water pollution control and abatement to achieve compliance with the terms and conditions of the permit. Proper operation and maintenance includes but is not limited to effective performance based on designed facility removals, adequate funding, effective management, adequate operator staffing and training and adequate laboratory and process controls including appropriate quality assurance procedures as described in 40 CFR Part 136 and applicable State Land and regulations. All permittees who operate a treatment works, except for sanitary landfills and land application of sludge or septage, must satisfy the licensing requirements of the "Licensing of Operators of Wastewater and Water Systems" N.J.S.A. 58:11-64 et seq. or other applicable law. This paragraph requires the operation of back-up or auxiliary facilities or similar systems when necessary to achieve compliance with the conditions of the permit or where required by applicable law or regulation.

6. Permit Actions

A. This permit may be modified, suspended, revoked, or terminated for cause. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance, does not stay any permit condition.

B. Causes for modification, revocation and reissuance, and suspension are set forth in N.J.A.C. 7:14A-2.12 et seq.

C. The following are causes for terminating or modifying a permit during its term, or for denying a permit renewal application:

(1) Noncompliance by the permittee with any condition of the permit;

(2) Failure to pay applicable fees (N.J.A.C. 7:14A-1.8), including the annual NJPDES permit fee which has been assessed by the New Jersey Department of Environmental Protection (NJDEP, hereinafter referred to as the Department);

(3) The permittee's failure in the application or during issuance process of a National Pollutant Discharge Elimination System (NPDES), Discharge Allocation Certificate (DAC), NJPDES Treatment Works Approval (TWA) or Construct and Operate permit to disclose fully all relevant facts, or the permittee's misrepresentation of any permit condition;

(4) A determination that the permitted activity endangers human health or the environment and can only be regulated to acceptable levels by permit modification or termination;

(5) When there is a change in any condition that requires either a temporary or a permanent reduction or elimination of any discharge controlled by the permit (for example, plant closure or termination of discharge by connection to a Domestic Treatment Works (DTW);

(6) The nonconformance of the discharge with any applicable facility, basin or area wide plans;

(7) If such permit is inconsistent with any duly promulgated effluent limitation, permit, regulation, statute, or other applicable state or federal law; or

(8) If a toxic effluent standard or prohibition is established pursuant to New Jersey Water Pollution Control Act N.J.S.A. 58:10A-1 et seq. or the regulations adopted pursuant to it, for a toxic pollutant which is present in the discharge, and such is more stringent than any limitation for such pollutant in this permit, this permit shall be revised or modified in accordance with the toxic effluent standard or prohibition and the permittee so notified of the revision or modification and date of required compliance.

7. Property Rights, Liability, and Other Laws

A. This permit does not convey and property rights of any sort or any exclusive privileges.

B. The issuance of a permit does not authorize any injury to persons or property or invasion of other private rights or any infrigement of applicable State or local law or regulations.

C. Nothing in this permit shall be deemed to preclude the institution of any legal action nor relieve the permittee from any responsibilities or penalties to which the permittee is or may be subject to under any federal, state or local law or regulation.

D. Nothing in this permit shall be construed to exempt the permittee from complying with the rules, regulations, policies, and/or laws lodged in any agency or subdivision in this State having legal jurisdiction.

8. Duty to Provide Information

A. The permittee shall furnish to the Director, Division of Water Resources, NJDEP, (hereinafter referred to as the Director), within a reasonable time, any information which the Director may request to determine whether cause exists for modifying suspending, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The permittee shall also furnish to the Director, upon request, copies of records required to be kept by this permit.

B. Annual Reports. The permittee must prepare and submit two copies of a facility annual report to the Department as per N.J.A.C. 7:26-7.6(f)2 as well a a generator's annual report per N.J.A.C. 7:26-7.4(g) by March 1 of each year.

C. Where the permittee becomes aware that he has failed to submit any relevant facts in a permit application, or has submitted incorrect information in a permit application or in any report to the Director, the permittee shall promptly submit such facts or information.

D. All reports and submittals required by this permit are to be submitted to the Department of Environmental Protection at the following address:

Department of Environmental Protection
Division of Water Resources
Chief, Ground Water Quality Control Section
CN-028
Trenton, N.J. 08625

9. Inspection and Entry

A. The permittee shall allow the Regional Administrator of the United States Environmental Protection Agency (USEPA), the Department, or any authorized representative(s), upon the presentation of credentials and other documents as may be required by law, to:

(1) Enter upon the permittee's premises where a discharge source is or might be located or in which monitoring equipment or records required by a permit are kept, for-purposes of inspection, sampling, copying or photographing to determine the permitee's compliance with the terms and conditions of this permit.

(2) Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

(3) Inspect, at reasonable times, any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and

(4) Sample or monitor, at reasonable times, for the purpose of assuring permit compliance or as otherwise authorized by the State Act, any substances or parameters at any location. This shall include, but not be limited to, the drilling or installation or monitoring wells for the purpose of obtaining samples of ground water, soil and vegetation and measuring ground water elevations.

B. Any refusal by the permittee, facility land owner(s), facility lessee(s), their agents, or any other person(s) with legal authority, to allow entry to the authorized representatives of the NJDEP and/or USEPA shall constitute grounds for suspension, revocation and/or termination of this permit.

C. By acceptance of this permit, the permittee hereby agrees, consents and authorizes the representatives of the NJDEP and/or USEPA to present a copy of this permit to any municipal or state police officer having jurisdiction over the premises occupied by the permittee in order to have said officer effectuate compliance with the right of entry, should the permittee at any time refuse to allow entry to said inspectors.

D. By acceptance of this permit, the permittee waives all rights to prevent inspections by authorized representatives of the NJDEP and/or USEPA to determine the extent of compliance with any and all conditions of this permit and agrees not to, in any manner, seek to charge said representatives with the civil or criminal act of trepass when they enter the premises occupied by the permittee in accordance with the provisions of this authorization as set forth hereinabove.

10. <u>Ground Water Monitoring Wells</u>

The permittee shall install and maintain ground water monitoring wells required by this permit at locations and according to specifications provided by the Department. All permit required monitoring wells shall be installed within 30 days of the Effective Date of the Permit. The monitoring wells shall provide turbidity-free water at a minimum rate of two gallons per minute or what the formation will yield with a properly installed and developed ground water monitoring well.

When a monitoring well cannot be used for the purpose of sample collection or ground water level measurements, the permittee shall replace (or repair to the satisfaction of the Department) the well at his own expense within 30 days of the missed sampling and/or measurement date. Said unusable wells shall be sealed, also at the permittee's own expense, in accordance with Department well sealing specifications within the same 30 days in which the well is replaced. Monitoring wells as required in this permit shall be considered as a monitoring device, which are required to be maintained under the provisions of the New Jersey Water Pollution Control Act N.J.S.A. 58:10A-10(f).

All monitoring wells must be installed by a New Jersey licensed well driller. The elevation to the nearest hundredth of a foot of the top of each well casing shall be established by a New Jersey licensed land surveyor within 30 days of the installation of the monitoring wells. The elevation established shall be in relation to the New Jersey geodetic control datum. Ground water monitoring wells and all point source discharges to ground water shall be located by horizontal control (latitude and longitude) using third order work, class II specification and by vertical control (elevation) using third order work. Within 30 days of the installation date of the monitor well, the permittee shall submit to the Department completed "Ground Water Monitoring Well Certifications - Form A and B for each well required to be sampled by the permit. Within 60 days of the Effective Date of the Permit, the permittee shall submit to the Department a plot plan of the facility showing the location of all discharges and the ground water monitoring well locations. The scale of the plot plan shall be at least one inch equals fifty (50) feet.

Each ground water monitoring well casing shall have permanently affixed to it a monitoring well number to be assigned by the Department, elevation of the top of the well casing, elevation of the top of the well casing above the ground level and latitude and longitude of the monitoring well.

The permittee shall use the existing and new wells as indicated in the Special Conditions to this permit.

11. Monitoring and Records

A. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.

B. The State Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of no more than $10,000 per violation, or by imprisonment for not more than 6 months per violation, or by both. This is specifically intended to include, but not be limited to, ground water monitoring wells and lysimeters.

C. The applicant shall perform all analyses in accordance with the analytical test procedures approved in the most recent edition of SW-846. Where no approved test procedure is available, the applicant must indicate a suitable analytical procedure and must provide the Department with literature references or a detailed description of the procedure. The Department must approve the test procedure before it is used. The laboratory performing the analyses for compliance with this permit must be approved and/or certified by the Department for the analysis of those specific parameters. Information concerning laboratory approval and/or certification may be obtained from:

New Jersey Department of Environmental Protection
Office of Quality Assurance
CN 409
Trenton, New Jersey 08625
(609) 292-3950

D. The permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for the active life of the facility and for any closure/post closure care period.

E. Records of monitoring information shall include:

(1) The date, exact place, and time of sampling or measurements;

(2) The individual(s) who performed the sampling or measurements;

(3) The date(s) analyses were performed;

(4) The individual(s) who performed the analyses:

(5) The analytical techniques or methods used; and

(6) The results of such analyses.

F. Monitoring results shall be reported on the Department's Monitoring Report Form (MRF); or, where these forms do not apply, in another format approved by the Department.

G. If the permittee monitors any pollutant more frequently than required by the permit, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the DWR, MRF, or other approved format.

H. Monitoring results shall be reported 45 days after the sampling month specified in Table 2. 60 DAYS ACCORDING TO COMMENT RESPONSE

I. Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule date must be submitted as described in General Condition 14.

12. <u>Signatory Requirements</u>

A. All permit applications shall be signed as follows:

(1) For a corporation, by a principal executive officer of at least the level of vice president;

(2) For a partnership or sole proprietorship, by a general partner or the proprietor, respectively; or

(3) For a municipality, state, federal or other public agency, by either a principal executive officer or ranking elected official.

B. <u>Reports</u>. Reports required by this permit and other information requested by the Department shall be signed by a person described in paragraph A of this section or by a duly authorized representative only if:

(1) The authorization is made in writing by a person described in paragraph A of this section;

(2) The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as a position of plant manager, operator of a well or well field, superintendent or person of equivalent responsibility; and

(3) The written authorization is submitted to the Department.

C. Changes to Authorization. If an authorization under paragraph B of this section is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of paragraph B of this section shall be submitted to the Department prior to or together with any reports, information, or applications to be signed by an authorized representative.

D. Certification (N.J.A.C. 7:14A-2.4(d). Any person signing any document under paragraph A or B of this section shall make the following certification: "I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment".

E. False Statements. Any person who knowingly makes a false statement, representation, or certification in any application, record, or other document filed or required to be maintained under the State Act shall upon conviction, be subject to a fine of not more than $10,000.00 or by imprisonment for not more than 6 months or by both.

13. Reporting Changes and Violations

A. Planned Changes. The permittee shall give notice to the Department as soon as possible of any planned physical alterations or additions to the permitted facility. The permittee shall obtain Departmental approval, prior to implementation, for any such alteration or addition subject to Departmental regulations or the conditions of this permit, including permit modification or permit revocation and reissuance if necessary.

B. Anticipated Noncompliance. The permittee shall give reasonable advance notice to the Department of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements. Such noncompliance shall not stay the applicability of said permit requirements or the applicability of Condition 1 of this permit, nor shall it relieve the permittee from the obligation to obtain all necessary Departmental approvals of such changes prior to implementation, including permit modification, permit revocation and reissuance, or issuance of an emergency permit, where necessary.

14. Reporting Noncompliance

A. The permittee shall report any noncompliance which may endanger health or the environment. The permittee shall provide the Department with the following information:

(1) A description of the discharge;

(2) Steps being taken to determine the cause of noncompliance;

(3) Steps being taken to reduce and eliminate the noncomplying discharge;

(4) The period of noncompliance, including exact dates and times. If the noncompliance has not been corrected, the anticipated time when the discharge will return to compliance;

(5) The cause of the noncompliance; and

(6) Steps being taken to reduce, eliminate, and prevent reoccurance of the noncomplying discharge.

B. The permittee shall orally provide the information in paragraphs A.(1) through (3) to the DEP Hotline (609) 292-7172 within 2 hours from the time the permittee becomes aware of the circumstances.

C. The permittee shall orally provide the information in paragraphs A.(4) through (5) to the DEP Hotline within 24 hours of the time the permittee becomes aware of the circumstances.

D. A written submission shall also be provided within 5 days of the time the permittee become aware of the circumstances. The written submission shall contain the information in A.(1) through (6).

E. Other Noncompliance. The permittee shall report all instances of noncompliance not reported under paragraphs 11.J, 11.K, 13.A, and 14.A through D at the time monitoring reports are submitted. The reports shall contain the information required in the written submission listed in paragraph 14.D.

F. The following shall be reported to the Department in accordance with paragraphs 14.A through D:

(1) In the case of any discharge subject to any applicable toxic pollutant effluent standard under Section 307(a) of the

Federal Act or under Section 6 of the State Act the information required by paragraphs 14.A(1) through (3) regarding a violation of such standard shall be provided to the Department within 2 hours from the time the permittee becomes aware of the circumstances. The information required by paragraphs 14.A(4) through (6) shall be provided to the Department within 24 hours from the time the permittee becomes aware of the circumstances. Where the information is provided orally, a written submission covering these points must be provided within five working days of the time the permittee become aware of the circumstances covered by this paragraph.

(3) The information required in paragraphs 14.A(1) through (3) shall be provided to the Department within 2 hours where a discharge described under paragraphs 14.F(1) or (2) is located upstream of a potable water intake or well field. The information required by paragraphs 14.A(4) through (6) shall be provided to the Department within 24 hours. If this information is provided orally, a written submission covering these points must be provided within five days of the time the permittee becomes aware of the discharge.

(4) Any bypass which <u>violates</u> any eflfuent limitations in the permit shall be reported within 24 hours unless paragraphs 14.F(1) through (3) are applicable. (See Section 15.)

(5) Any upset which <u>violates</u> any effluent limitation in the permit shall be reported within 24 hours unless paragraphs 14.F(1) through (3) are applicable. (See Section 16.)

(6) Violation of a maximum daily discharge limitation for any of the pollutants listed by the Department in the permit shall be reported within 24 hours unless paragraph 14.F(1) through (3) are applicable (See N.J.A.C. 7:14A-3.13(a)7.).

15. <u>Bypass</u>

A. <u>Bypass not exceeding limitations</u>. The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it is also for essential maintenance to assure efficient operation. These bypasses not subject to the provisions of paragraph B. and C. of this section.

B. <u>Notice</u>

(1) <u>Anticipated Bypass</u>. If the permittee knows in advance of the need for a bypass, he shall submit prior notice, if possible, at least thirty (30) days before the date of the bypass.

(2) Unanticipated Bypass. The permittee shall submit notice of an unanticipated bypass as required in paragraph 14.F.(4).

C. Prohibition of Bypass

(1) Bypass is prohibited, and the Department may take enforcement action against a permittee for bypass unless:

a. Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

b. There was no feasible alternative to the bypass, such as the use of auxilary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satified if the permittee could have installed adequate backup equipment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and

c. The permittee submitted notices as required under paragraph B of this section.

(2) The Department may approve an anticipated bypass, after considering its adverse effects, if the Department determines that it will meet the three conditions listed above in paragraph C.(1) of this section.

16. Upset

A. Effect of An Upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limitations if the requirements of paragraph B. of this section are met. Where no determination was made during administrative review of claims that noncompliance was caused by upset, and there has been no Departmental action for noncompliance, the lack of such determination is final administrative action subject to judicial review.

B. Conditions Necessary for A Demonstration of Upset. A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

(1) An upset occurred and that the permittee can identify the specific cause(s) of the upset;

(2) The permitted facility was at the time being properly operated;

(3) The permittee submitted notice of the upset as required in paragraph 14.F.(5); and

(4) The permittee complied with and remedial measures required under Section 4 above.

C. Burden of Proof. In any enforcement proceeding the permittee seeking to establish the occurence of an upset has the burden of proof.

17. Discharge Permitted

The permittee shall discharge to surface waters, land or ground waters of the State, directly or indirectly, only as authorized herein and consistent with the terms and conditions of this permit.

18. Operation Permitted

The operation of a waste treatment or disposal facility shall at no time create: (1) a direct discharge to surface waters of the State, except as authorized by NJDEP; (2) a persistent standing or ponded condition for water or waste on the permittee's property except as specifically authorized by this permit; or (3) any standing or ponded condition for water or waste on adjacent properties unless these activities are specifically included within the permit.

19. Oil and Hazardous Substance Liability

The imposition of responsibilities upon, or the institution of any legal action aganist the permittee under Section 311 of the Federal Act shall be in conformance with regulations promulgated pursuant to Section 311 of the Federal Act governing the applicability of Section 311 to discharges from facilities with NJPDES permits.

20. Reopener Clause for Toxic Effluent Limitations

Notwithstanding any other condition of this permit, if any applicable toxic effluent standards, limitation or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is promulgated under Sections 301(b) (2) (C) and (D), 304(b) (2), and 307(a) (2) of the Federal Clean Water Act or Sections 4 or 6 of the State Act for a toxic pollutant and that effluent standard, limitation, or prohibition is more stringent than any limitation on the pollutant in the permit (or controls a pollutant not limited in the permit), this permit shall be promptly modified or revoked and reissued to comform to that effluent standard, limitation or prohibition.

21. Availability of Information

A. NJPDES permits, effluent data, and information required by NJPDES application forms provided by the Regional Administrator or Director (including information submitted on the forms themselves and any attachments used to supply information required by the forms) shall be available for public inspection at the offices of the Director.

B. In addition to the information set forth in paragraph A., any other information submitted to EPA and/or the Department in accordance with the conditions of this permit shall be made available to the public without further notice unless a claim of business confidentiality is asserted at the time of submission in accordance with the procedure in 40 CFR Part 2 (Public Information) and/or Subchapter 11 of the "Regulations Concerning the New Jersey Pollutant Discharge Elimination System."

C. If a claim of confidentially is made for information other than that enumerated in paragraph A., the information shall be treated by the Department in accordance with the procedures in N.J.A.C. 7:14A-11.1 et seq. Only information determined to be confidential under those procedures shall not be made available by NJDEP for public inspection.

22. Effective Date of Permit

A. This permit shall become effective in its entirely on the date indicated (Effective Date) on the first page of this permit unless a request for an adjudicatory hearing is granted pursuant to the provisions of N.J.A.C. 7:14A-8.11 et seq.

B. For purposes of judicial review, final agency action on a permit does not occur unless and until a party has exhausted its administrative remedies under N.J.A.C. 7:14A-8.9 et seq. Any party which neglects or fails to seek such review thereby waives its opportunity to exhaust available agency remedies.

23. Transfer of Permit

A. This permit is not transferable directly to a new owner or operator.

B. The permittee shall notify the Department at least 180 days in advance of any proposed change of ownership or operational control of a facility. The notice shall include:

i) A disclosure statement prepared by the prospective new permittee meeting the requirements of N.J.A.C. 7:26-12.2(h);

ii) A written agreement between the existing permittee and the prospective new permittee containing a specific future date for transfer of permit responsiblities coverage and liabilities between them;

iii) A demonstration that the financial responsiblity requirements of N.J.A.C. 7:26-9.10 and N.J.A.C. 7:26-9.13 will be met by the prospective new permittee.

C. A new owner or operator may commence operations at the facility only after the existing permit has been revoked and reissued pursuant to N.J.A.C. 7:26-12.6(c) and N.J.A.C. 7:14A-2.12.

D. The Department reserves the right to terminate the existing permit for cause pursuant to N.J.A.C. 7:26-12.7 and N.J.A.C. 7:14A-2.13.

E. The permittee of record remains liable for ensuring compliance with all conditions of the permit unless and until the existing permit is reissued in the name of the new owner or operator.

24. <u>Severability</u>

The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit, shall not be affected thereby.

25. <u>Stay of Conditions, N.J.A.C. 7:14-8.10</u>

A request for an adjudicatory hearing shall not automatically result in a stay of the conditions of this permit.

26. <u>Definitions</u>

A. Unless otherwise stated, all terms shall be as defined in the "Regulations Concerning the New Jersey Pollutant Discharge Elimination System" N.J.A.C. 7:14A-1 <u>et seq</u>.

(1) "Aliquot" means a sample of specified volume used to make up a total composite sample.

(2) "Bypass" means the intentional diversion of wastes from any portion of a treatment facility.

(3) "Composite" means a combination of individual (or continuously taken) samples (aliquots) of at least 100 milliliters, collected at periodic intervals over the entire discharge day. The composite must be flow proportional; either the time interval between each aliquot or the volume of each aliquot must be proportional to either the stream flow at the time of sampling or the total stream flow since the collection of the previous aliquot. Aliquots may be collected manually or automatically. For a continuous discharge, a minimum of 24 aliquots (at hourly intervals) shall be collected and combined to constitute a 24-hour composite sample. For intermittent discharges of more than 4 hours duration, aliquots shall be taken at a minimum of 30-minute intervals. For intermittent discharges of lass than 4 hours duration, aliquots shall be taken at a minimum of 15-minute intervals.

(4) "EDP" means Effective Date of Permit.

(5) "Grab" means an individual sample of at least 100 milliliters collected over a period not exceeding 15 minutes.

(6) "Monthly" means one day each month (the same day each month) and a normal operating day (e.g., the 2nd Tuesday of each month).

(7) "Multiple Grab Composite" - means a combination of individual samples (aliquots) collected at a specified frequency over a specified time period. Each aliquot must be collected in a glass vial with septum cap, filled to the top leaving no air bubbles, and iced filled delivered for analysis. Each aliquot shall be analyzed individually. The recorded value will be flow proportioned average of the individual analyses for the specific time period.

(8) "Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance

to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventative maintenance, or careless or improper operation.

(9) "Weekly" means every seventh day (the same day each week) and a normal operating day.

27. <u>Annual Permit Fee, N.J.A.C. 7:14A-1.8</u>

The permittee shall pay the annual NJPDES permit fee which has been assessed by the Department.

SPECIAL CONDITIONS
TO THE AMERADA HESS (PORT READING) FACILITY
OPERATING PERMIT

This permit, along with the referenced appendices and attachments herein specified, shall constitute the sole Resource Conservation and Recovery (RCRA) Act and Industrial Waste Management Facility (IWMF) permit, for the operation of the Amerada Hess (Port Reading) Facility. Unless otherwise stated, where contradictions between statements contained in the original application and addendums occurs, the later submittal shall prevail.

The documents referenced as part of this permit include:

RCRA Part A Application dated March of 1984
IWMF Permit Application dated May of 1984
Addendum A to the IWMF Permit Application dated March of 1985
Addendum B to the IWMF Permit Application dated March of 1986

and all Figures, Tables, Diagrams, Attachments and Appendices contained therein.

Approval is hereby granted for the operation and monitoring of an existing active landfarms with a areal extent of approximately 87,120 sq. ft. Any approval of land treatment and associated ground water and soil monitoring previously isssued by the Division of Water Resources is hereby superceded.

1) Dimensions of Land Treatment Zone

The vertical dimension of the treatment zone for the No. 1 Land Treatment Unit is five (5) feet.

The nominal horizontal dimensions of Bay 1 of the No. 1 Land Treatment Unit's treatment zone is approximately 300 by 218 feet (65,340 sq. ft.).

The nominal horizontal dimensions of Bay 2 of the the No. 1 Land Treatment Unit's treatment zone is approximately 100 by 218 feet (21,780 sq. ft.).

The total area for the No. 1 Land Treatment Unit is approximately 87,120 sq. ft.

2) Operating Practices to Maximize Treatment

The operating practices to maximize treatment as described in section 3.4 of the IWMF permit application shall be performed. These are to include but not be limited to:

a) A waste application rate that will allow no more than an average of 6% total petroleum products as expressed in a dry weight basis at any time in the landfarm soils (zone of incorporation).

b) Control of soil pH

c) Enhancement of Microbial Chemical Reactions

d) Control of soil moisture

e) Waste loading rate and schedule:

May 1 through September 30 - 2,504 barrels of 6% total petroleum products per month or equivalent

October 1 through April 30 - 1,252 barrels of 6% total petroleum products per month or equivalent

No application shall be made when:

i. Average daily temperatures are not projected above 32 degrees Fahrenheit for the 24 hour day;

ii. Rainfall is occurring or forecast within 24 hours;

iii. Standing water is present on the landfarm surface; or

iv. The landfarm surface is frozen.

3) Surface Water Run-Off

Surface water run-off shall be controlled and collected as described in sections 3.8.2, 3.8.3, and 3.8.4 of the IWMF permit application.

4) Permitted Waste Types

No wastes from sources other than the Amerada Hess Corporation within the State of New Jersey are permitted to be applied to the landfarm. Waste types X-722 and X-728 are therefore not permitted to be applied to the landfarm unless they are generated by Hess within the State of New Jersey.

Waste types that are permitted to be applied to be applied to the landfarm include:

a) wastes types K-049, K-050, K-051, X-722, X-728 and non-hazardous biomass); and

b) waste types K-052, P-110, and oil-contaminated soils (from Hess closure activities) upon receipt of written approval from the Department.

All wastes applied to the landfarm must be analyzed annually to recharacterize the waste to be applied to the landfarm.

The permittee shall maintain and submit monthly reports of the amounts of sludge applied and leachate removed from the landfarm.

5) Waste Recharacterization Plan

Amerada Hess shall perform the activities (recharacterize the waste annually) as described in sections 1.4 and 3.6.2 of the IWMF permit application and shall also comply with the following requirements:

Within 30 days of the EDP, Amerada Hess must submit a Waste Recharacterization Plan that details the methods and procedures that will be utilized for future annual waste Re characterization.

This plan must include:

a) annual detailed recharacterization of the waste applied to the landfarms with analyses for Target Compound List +30, facility specific compounds, and a GC/MS organic compound scan. These analyses must be conducted annually (in July) The results must be reported to the Department within sixty (60) days of the sampling date. Waste not available for sampling and analysis (recharacterization) shall be sampled and analyzed as soon as available. The results of these analyses must be reported to the Department two weeks prior to application of the waste to the landfarm. To be included are split samples and duplicates, analyzed at a NJDEP certified laboratory as a performance check on the internal lab;

b) This plan shall outline and describe a study of the possible techniques to increase treatment efficiency. This study is to be performed by Hess in the event that the mass of any constituent in the leachate exceeds 1% of that constituent applied to the landfarm.

The study shall include, at a minimum, respirometer and field testing for evaluation of pretreatment or other techniques to increase the efficiency of the landfarm. The plan for this study must be submitted within 30 days of the discovery of the exceedence described above. Hess shall commence the study upon receiving Departmental approval and shall report the results to the Department upon completion of the study.

The best alternative (of all the alternatives described in the results of the study) will be chosen by the Department and implemented by Hess.

c) Chain-of-custody procedures (including a completed example form), personnel qualifications, complete analysis methodologies, and QA/QC procedures used for waste characterization that conform with the most recent (1987) version of the EPA Publication SW-846 for both the internal and NJDEP certified laboratory used;

d) Qualifications of the sampling and analysis personnel for internal and commercial labs, either within the text or referenced in an appendix;

e) Description of the procedures and frequency of lab equipment inspection, maintenance, and servicing, including decontamination procedures for the internal and external laboratories, and

f) Description of waste stream containment prior to landfarm treatment, including:

- -compatibility with waste container;
- -compatibility with nearby waste;
- -compatibility with previously stored waste; and
- -procedures to avoid difficulties.

6) <u>Hazardous Constituents</u>

The hazardous constituents that are to be degraded, transformed, or immobilized through land treatment operations include:

a) METALS

Antimony
Arsenic
Barium
Beryllium
Cadmium
Chromium
Lead

Mercury
Nickel
Selenium
Vanadium
Cobalt

+ silver, copper

b) VOLATILE ORGANIC COMPOUNDS

Benzene
Carbon Disulfide
Chlorobenzene
Ethylbenzene
Toluene
m - Xylene
a & b Xylenes

MEK
chloroform
1,2. dibromoethane
1,2. dichloroethane
1,4 dioxane
1,4
MTBE
Styrene
TBA
Vinyl Choride

c) ACID COMPOUNDS

o - Cresol
m & p Cresols
2,4 Dimethylphenol
Phenol

d) BASE/NEUTRAL COMPOUNDS

Anthracene
Benzo(a)Anthracene
Benzo(b)Flouranthene
Benzo(a)Pyrene
Bis (2-Ethylhexyl Phthalate
Butyl benzyl phthalate
Crysene
Dibenzo(a, h)Acridine
Dibenzo(a, h)Anthracene
1,2 Dichlorobenzene
Dimethyl phthalate
Di-n-butyl phthalate
Fluoranthene
Indene
1-Methyl Naphthalene
Naphthalene
Phenanthrene
Pyrene
Bis (2 Chloroisopropyl) ether

e) CONVENTIONAL

Reactive Sulfide

f) Compliance Point

The Point of Compliance for ground water monitoring purposes shall be a vertical plane extending down to the confining aquifer at the hydraulically downgradient limit of the waste management units. For the North landfarm, this plane shall be defined by the monitoring wells LN-2, LN-3, and LN-4. For the No. 1 landfarm, this plane shall be defined by the monitoring wells L1-2, L1-3, and L1-4.

g) Statistical Analysis of Ground Water Monitoring Results

Continued on next page.

7) <u>Unsaturated Zone Monitoring</u>

a) The owner or operator shall sample the background lysimeters (LYI-1 and LYI-2) annually (July) according to the schedule in Table 1 for the constituents listed in Special Condition 6.

b) Leachate shall be collected and analyzed semiannually (Jan. and July). The January leachate samples are to be analyzed for the Priority Pollutants plus 40 and the July samples are to be analyzed for the Skinner's List plus as indicated in Table 1.

c) Unsaturated zone soil cores from the No. 1 landfarm shall be taken and analyzed according to the schedule in Table 1. At least three randomly distributed soil cores shall be taken from the landfarm. The soil cores may be composited to form a single composite sample for depth fraction sampled.

The frequency of the monitoring for the "Skinner List plus" in the unsaturated zone may be increased from annually as levels of immobilized and undegraded contaminants increase over time in the landfarm soils.

d) Sampling and Analysis Procedures

The sampling methods described in section 3.5 of the IWMF permit application and the methods of analysis for soil pore liquids and soil cores as described in item D7c(6) of Addendum A of the IWMF permit application shall be used.

8) <u>Ground Water Monitoring</u>

The Amerada Hess (Port Reading) Corporation shall conduct a ground water Detection Monitoring Program for the land treatment units as described in section 2.6 of the IWMF permit application. The detection monitoring program shall include but not be limited to the following:

a) Monitoring Wells

Ground water samples shall be collected from the following monitoring wells:

L1-1 (upgradient)
L1-2R
L1-3
L1-4

Well BG-2 and BG-3 may also be used as background wells for the No. 1 Landfarm.

The locations of all the ground water monitoring wells required to be sampled or monitored by the Department are shown on Attachment 1.

If the monitoring wells are damaged or are otherwise rendered inadequate for their intended purpose, the Administrator, Water Quality Management Element, shall be notified within five (5) days in writing indicating:

1) Which wells were damaged or rendered inadequate for their intended use;

2) The cause and extent of damage or the reason for the inadequacy;

3) If the sampling schedule as required in this permit will be violated or if the results of the sampling may reasonably become misleading;

4) The date that the well will again be operational. Damaged wells must be replaced or repaired within thirty (30) days after the damage has occurred. Any replacement well must be installed within a 10 foot radius of the existing well. The wells must be sampled within five (5) days after they have been installed. A replacement well must meet the construction requirements established by the Department. A valid New Jersey well permit is required prior to the installation of the replacement well; and

5) The next date that the well will be sampled.

Failure to follow these procedures is a violation of this permit and may subject the permittee to the provisions of N.J.S.A. 58:10A-10.

The permittee shall provide the Ground Water Quality Control Section a minimum of two weeks notification prior to the installation of any new ground water monitoring wells.

b) The ground water shall be sampled for the parameters listed below in Table 3 of under Special Condition 8 g).

Results of monitoring shall be submitted to the Department within 60 days of the sampling date. The permittee shall complete the forms required on the "Monitoring Report - Transmittal Sheet (Form T-VWX-014) which is included as a part of this permit. Failure to submit sampling data on the forms required in the "Monitoring Report-Transmittal Sheet" shall be considered by the Department to be a violation of the permit sampling requirements and may place the permittee subject to civil and administrative penalties pursuant to N.J.S.A. 58:10A-10. It shall be the permittee's sole responsibility to maintain an adequate supply of the required report forms.

Additional constituents may be added to quarterly monitoring requirements based on the levels of contaminants observed in the annual "Skinner List plus" analytical results upon written notification by the Department.

In addition, the owner or operator shall determine the ground water flow gradients, rates, and directions for all geologic formations or zones monitored at least annually, and shall submit these for Departmental review and evaluation.

c) Sampling and Analysis Procedures

The sampling methods described in the USEPA's RCRA Technical Enforcement Guidance Document (TEGD) and described in the Amerada Hess (Port Reading) Corporation Saturated and Unsaturated Zone Monitoring Procedures (submitted November 5, 1987) shall be followed for all sampling.

Additionally Amerada Hess shall submit within 30 days of the EDP, documentation of the QA/QC procedure used for ground water monitoring analysis including a completed copy of the attached NJDEP "QUALITY ASSURANCE / QUALITY CONTROL (QA/QC) PACKAGE" (Attachment 2).

d) The owner or operator may establish background values for constituents in the ground water as described in 8 g).

e) Concentration Limits

The concentration limits for the Principal Hazardous Constituents listed in 8d above shall be the natural background values as determined in 8d above. These concentration limits are for reference only, the ground water detection monitoring program requires statistical test for identification of significant increases of waste constituents in ground water.

TABLE 1

Unsaturated Zone Monitoring Requirements

	Frequency			
	Soil Core Composites*			Pore Liquids
Parameter	Zone of Incorporation (0-1.5 ft.)	Treatment Zone (1.5-3.0 ft.)	Unsaturated Zone (3-4 ft.)	Lysimeter Liquids
Skinner List Plus**	annually	annually	annually	annually
pH	annually	annually	annually	annually
conductivity	annually	annually	annaully	annually
total nitrogen	annually	annually	annually	annually
oil & grease	annually	annually	annually	annually

* Three soil cores from each landfarm are to be composited for each sample per depth fraction.

** including:
cobalt
ethylbenzene
1, methyl naphthalene
m - Xylene
o & p - Xylene
anthracene
phenanthrene
pyrene

g) Statistical Analysis of Groundwater Monitoring Results

1) The following waste constituents are considered to be the waste indicator parameters for statistical analysis of significant increases in groundwater under the DETECTION monitoring program.

TABLE 2
Waste Indicator Parameters

Volatile Organic Compounds	Trigger Values* (ppb)
Benzene	15
Toluene	20
Base Neutral Compounds	
Napthalene	5.3
Acenaphthene	6.3
Phenanthrene	18
Metals	
Cadmium	8.0
Chromium	26.7
Lead	16.5
Nickel	21.8

Dissolved?

Note: Additional constituents may be added to the list of waste indicators parameters based on the results of more comprehensive sampling (without modification of the permit).

* The "trigger value" for each constituent is the minimum concentration at which the constituent can be reliably detected (with 95% confidence) as an unknown in a production laboratory using the stated methods. This "trigger value" is based on USEPA published method of detection limits (MDLs) for organics (40 CFR 136) and the USEPA published minimum optimal concentration limits for metals (USEPA / 1020) and the understanding that the vast majority of variation in reported concentrations due to analytical error falls within ten standard deviations of the signal to noise ratio for the methods used.

2) Upon each sampling event, the concentration reported for each waste indicator parameter in each well shall be compared to its "trigger value". Note that the method of detection limits reported in excess of their "trigger value" are considered equivalent to values reported in excess of the "trigger value".

3) Waste indicator parameters (as identified in Table 2 above) reliably detected (in excess of their "trigger value") in downgradient wells shall be considered to represent significant increases in hazardous constituents unless the reported concentrations can be shown to be NOT significantly different from the concentrations found in background wells using a CABF student's t-test statistical analysis.

Note:

a) The statistical test of significant increases in waste indicator parameters requires at least four replicates to be compared to a background value derived from a sufficient data base, defined in N.J.A.C. 7:14A-6.15(h)7 as being a minimum of 16 data points.

b) The background data set shall consist of the first 16 data points gathered from the background system (16 data points per well if more than one is used) and shall include data gathered under this or the previous permit and/or may be gathered at an accelerated rate not to exceed 4 replicates per month.

c) Results of statistical test must be reported along with the analytical results within 45 days of sampling unless a background data set does not yet exist. If a complete background data set of 16 data points does not exist the permittee shall obtain at least four samples per month until 16 background data points are obtained and the results of the statistical test must be reported within 45 days of obtaining the 16th data point.

4) The Department reserves the right to require the use of the statistical (CABF student's t-test) for any parameter based upon the professional opinion that the unit may be affecting ground water (e.g. if concentrations of waste indicator parameters are reported consistantly below their "trigger value" at a frequency that indicates the constituent may be present).

5) Significant increases of hazardous constituents in downgradient wells shall require the submittal of a COMPLIANCE monitoring program upon similar results to confirmatory resampling as per N.J.A.C. 7:14A-6.15(h)8i(1).

6) The analytical results, along with a summary report showing the results of the waste indicator parameters in relation to their "trigger value" and any statistical test for significant increases, shall be submitted to the Ground Water Quality Control Section for each scheduled sampling period.

7) In addition to those waste indicator parameters listed above, the results of the analyses stipulated in Table 3 below shall be submitted with the indicated frequency.

8) Hess may request a modification of the statistical method to be used to calculate significant increases in waste constituents upon the submittal of an equivalent alternative method.

Table 3
Ground Water Monitoring Requirements

PARAMETER	UNITS	SAMPLING MONTH	SAMPLE TYPE	REPORTING MONTH
Elevation of top of monitor well casing (to be determined once but reported as indicated)		JanAprJulOct	N/A	FebMayAugNov
Depth to Water Table from top of casing prior to sampling		JanAprJulOct	N/A	FebMayAugNov
Depth to Water Table from original ground level prior to sampling		JanAprJulOct	N/A	FebMayAugNov
pH	SU	JanAprJulOct	grab	FebMayAugNov
Priority Pollutant Scan Plus 40 *2 excluding Pest. & PCBs		JanApr Oct	grab	FebMay Nov
Skinner's List Plus cobalt, ethylbenzene, 1, methyl naphthalene, m - xylene, anthracene, phenanthrene, pyrene		Jul		Aug

Notes:

*1
"Grab" means an individual sample of at least 100 milliliters collected over a period not exceeding 15 minutes.

*2 Plus 40 refers to tentative identification of unknowns by 624/625 GC/MS to "identify" substances with peak areas greater than 10% of the nearest internal standard being searched based upon a 50 ppb internal standard concentration. Appropriate adjustment of concentration shall be make if a different concentration of internal standard is employed. A forward library search of the EPA/NBS/NIH Mass Spectral Library shall be performed to tentatively identify:

a. The 15 non-targeted compounds of the greatest apparent concentration in the purgeable organic fraction of the scan for each sample.

b. The 15 non-targeted compounds of the greatest apparent concentration in the base/neutral extractable organic fraction of the scan for each sample.

c. The 10 non-targeted compounds of the greatest apparent concentration in the acid extractable fraction of the scan for each sample.

note: For non-targeted compounds, a forward search using the EPA/NBS/NIH Mass Spectral Library must be performed. The three best matches must be listed and inspected by the Mass Spectral Interpretation Specialist. If the spectral do not meet the criteria cited. above, the compound should be reported as "Unknown". If possible, and/or on the request of the Department, additional classification of the unknown compounds should be presented (i.e. unknown aromatic, unknown hydrocarbon, unknown acid compound, unknown chlorinated compound, etc.). For estimating concentration, the laboratory shall assume a response factor of one, and estimate the concentration by comparison to the peak height of the nearest internal standard on the reconstructed total ion chromatogram.

h) Response to Significant Increases

The response required to significant increases in contaminants in compliance point monitoring wells (as determined by a concentration in ground water exceeding its trigger value and/or a significant increase based on a Student's t-test) shall follow the requirements of N.J.A.C. 7:14A-6.15(i)8.

9) Preparedness and Prevention Plan

The permittee shall equip the facility with emergency equipement in order to minimize the possibility of a fire, explosion, or any unplanned, sudden or non-sudden release of hazardous wastes or hazardous waste constituents to the air, surface water, or ground water which could threaten the environment or human health. The facility's equipment and procedures for preparedness and prevention must include, but not be limited to, those described in Sections 1.7, 1.10, & 1.11 and of the IWMF permit application, and item G-4e of Addendum A, as well as the following:

a) Portable fire extinguishers shall be mounted in locations throughout the permitted facility.

b) An adequate volume of water to supply hose streams and portable foam producing equipment necessary in fighting fires during emergencies shall be made available and accessible at all times.

c) Telephone communications shall be locally maintained to summon emergency assistance from local fire departments, police departments, and state or local emergency response teams.

d) Absorbent compounds shall be readily available within the facility to be employed as spill combatant if a spill should occur.

This equipment shall be tested and maintained as necessary to assure its proper operation in time of emergency.

10) Contingency Plan

The Contingency Plan as described in Section 1.8 of the IWMF permit application, as well as items G-4c, G-4f, G-7, and G-8 of Addendum A to the IWMF permit application, shall be implemented immediately whenever a fire, explosion, or sudden release of hazardous waste and/or product occurs. The primary emergency coordinator is designated as follows:

Larry A. Smith
Phone (201) 636-3000 Ext. 600

In the event of an emergency, the primary or alternative emergency coordinator shall be responsible for the occurence assessment, giving appropriate external notifications and internal facility communications.

a) In the event of an emergency, a local alarm system shall be activated to alert employees. The Port Reading Police and/or Fire Departments shall be notified immediately.

b) Semi-annual drills involving all employees and appropriate local authorities shall be conducted to test emergency response capabilities at the facility in accordance with the contingency plan and emergency procedures developed pursuant to N.J.A.C. 7:26-9.7.

c) In the event of spill the following shall be notified immediately:

1) Environmental Protection Agency
Oil and Hazardous Material Section
Raritan Depot, Edison, NJ 08817
Telephone (201) 548-8730

2) New Jersey Department of Environmental Protection
Spill Response Unit
Trenton, NJ 08625
Telephone (609) 292-7172

d) The permittee is advised that the Department of Community Affairs adopted on February 18, 1985 the New Jersey Uniform Fire Code N.J.A.C. 5:18-1 et seq. and High Level Alarm Regulations N.J.A.C. 5:18B-1 et seq. BOCA Basic/National Fire Prevention Code/1984 was adopted by reference as part of these regulations. All the aforementioned regulations which are applicable to the Amerada Hess (Port Reading) Corporation facility, shall be complied with under the Department of Community Affairs regulations.

11) <u>Inspections</u>

The permittee shall perform inspections of the facility as described in Sections 1.6 and 3.8.5 of the IWMF permit application, as well as section F-2a(a) of Addendum A to the application.

a) Facility security - gates, locks, and warning signs shall be inspected daily.

b) Facility security - fence integrity, gates, and tie wires shall be inspected weekly.

c) Ground water monitoring wells and lysimeters shall be inspected on a weekly basis for structural integrity and/or damage.

A written daily inspection log indicating dates of inspection, inspector's name, of conditions found, and the steps taken to correct the conditions shall be kept on-site. Duplicates of this log shall be maintained on file for a minimum of three years and shall be supplied to Department representatives upon request.

12) <u>Security</u>

The permittee shall operate a security program as described in Section 1.5 of the IWMF permit application. The security program shall include, but not be limited to, the following:

a) The permittee shall prevent the unknowing entry and minimize the possibility for the unauthorized entry of persons or livestock onto the active portion of the facility.

b) The permittee shall post a sign with legend, "Danger-Unauthorized Personnel Keep Out", at each entrance to the active portion of the facility, and at other locations, in sufficient numbers to be seen from any approach to this active portion.

13) <u>Personnel Training</u>

Facility personnel shall be trained in general safe work practices and specific job assignment hazard awareness as is described in Section 1.14 of the IWMF permit application and section H-1e of Addendum A of the application. New facility employees shall complete a training course within six (6) months from the employment start date. The permittee shall also make available the appropriate Material Safety Data Sheets (OSHA Form 20) to employees.

The training program shall be directed by a person trained in hazardous waste management procedures. Instruction shall be received by facility personnel in the classroom and on-the-job. The instruction shall include, but not be limited to, the following:

a) General First Aid

b) Proper product and waste handling procedures

c) Hazards associated with each waste

d) Record keeping and inspections

e) Classroom review of the contingency plan, operating plan, inspection procedures, waste analysis, and State/Federal Regulations

f) Emergency procedures

g) Using, inspecting, repairing, and maintaining emergency and monitoring equipment

h) Key parameters for feed shut-off, facility valving

i) Communication and alarm systems

j) Response to ground water contamination incidents

k) Response to fires, spills, or explosions

l) Shutdown of operations

m) Normal operating responsibilities

n) Accident prevention

o) Respiratory protection

14) Financial Requirements

a) The permittee shall maintain the liability insurance documented to the Department in section 1.18 of the IWMF permit application, or obtain and document to the Department other liability insurance or financial test for sudden and accidental occurrences (as submitted March 28, 1988). The insurance or financial test shall be maintained in accordance with the requirements of the New Jersey Administrative Code.

b) The permittee shall maintain the financial assurance for closure and post-closure costs documented to the Department in Section 1.17 of the original permit application; items I-4, I-5, I-6,and I-7 of Addendum A; and items 41 and 42 of Addendum B to the IWMF permit application, or obtain and document to the Department other financial assurance, as specified in N.J.A.C. 7:26-9.10.

c) The permittee must adjust the facility's closure cost estimate for inflation within thiry (30) days after each anniversary of the date on which the first closure cost estimate was prepared. Whenever the current closure cost estimate increases to an amount greater than the amount of the financial mechanism, the permittee, within sixty (60) days after the increase, must either adjust the amount of the financial mechanisms to be increased so that it at least equals the current closure cost estimate and submit evidence of such increase to the Department, or obtain and document to the Department other financial assurance, as specified in N.J.A.C. 7:26-9.10, to cover the increase.

d) The permittee can arrange for other financial assurances in accordance with N.J.A.C.

15) Closure Plans

a) The permittee shall close the facility in the manner that is described in Section 1.15 and 3.9 of the IWMF permit application; items I-1d(6), I-1d(6)(b), I-1g and I-2d of Addendum A; and items #36-40 of Addendum B to the IWMF permit application.

b) The permittee shall keep a copy of the closure plan and all revisions to the plan at the facility until closure is completed.

c) The permittee shall amend the closure plan anytime changes in operating plans or facility design affect the closure plan or whenever there is a change in the expected year of closure of the facility. The plan must be amended within sixty (60) days of the changes.

d) The permittee shall notify the Department at least 180 days prior to the date the permittee expects to begin closure, except in cases where the facility's permit is terminated or if the facility is otherwise ordered by judicial decree or compliance order to cease receiving wastes or to close. The date when the owner or operator "expects to begin closure" shall be within thirty (30) days after the date on which the owner or operator expects to receive the final volume of wastes.

e) All deed restrictions as described in section 1.16 of the IWMF permit application shall be documented as part of the closure activities.

f) When closure is completed the owner or operator shall submit to the Department certification by an independent qualified soil scientist, in lieu of an independent registered professional engineer, that the land treatment unit has been closed in accordance with the specifications in the approved closure plan.

16) Post-Closure Plans

The permittee shall perform post-closure activities at the facility in the manner that is described in Section 1.15.3 of the IWMF permit application and those required by N.J.A.C 7:14A-4.7(m)3 as well as the financial assurances described in items 41 and 42 of Addendum B to the IWMF permit application or other financial mechinism as approved by the N.J.A.C.

17) Operating Record

The permittee shall keep a written operating record at the facility in which the information in N.J.A.C. 7:26-9.4(i) shall be recorded. The information should be recorded as it becomes available and maintained until closure of the facility.

18) Plans Available for Inspection

One complete set of all engineering designs and submissions required by this permit shall be kept on site and shall include, at a minimum, the items included in section 3.8 of the IWMF permit application and the revisions for the existing facilities as described in item 15 of Addendum B. These documents shall include but not be limited to: a narrative description of the operation of the facility and a facility layout drawing; this IWMF permit; and any other plans and submittals that may be required pursuant to this permit. These documents shall be kept on-site and shall be available for inspection by representatives of the Department. The following documents shall also be maintained at the facility site:

a) The Waste Analysis Plan outlined in Condition 20 of this permit, in accordance with N.J.A.C. 7:26-9.4(b)

b) Contingency Plan required by N.J.A.C. 7:26-9.7

c) Closure Plan and closure cost estimate required by N.J.A.C. 7:26-9.10(e)4.

d) Inspection schedule required by N.J.A.C. 7:26-9.4(f)

e) Personnel training documents and records required by N.J.A.C. 7:26-9.4(g)

f) Written operating record required by N.J.A.C. 7:26-9.4(i)

All amendments, revisions and modifications to any plan or cost estimates required by this permit shall be submitted to the Division of Water Resources for approval and permit modification, if necessary.

19) Posting of Notice

The notice concerning civil and criminal penalties for illegal disposal of hazardous waste shall be consipicuously posted and available for all employees to read.

20) Air Pollution Control and Water Resources

The permittee shall obtain all permits deemed necessary based on the results of volatilization measurements in the Land Treatment

Demonstration Project Report and all applicable rules and regulations of the Bureau of Air Pollution Control, Title 7, Chapter 27, and the Division of Water Resources, Title 7, Subtitle D of the New Jersey Administrative Code before this permit is deemed effective.

21) Permit Limitations

a) The issuance of a permit does not authorize any injury to persons or property or invasion of other private rights or any infringement of applicable Federal, State, or local laws or regulations.

b) This permit does not constitute the sole source of guidelines to be followed. Any new regulations concerning Water Quality, Air Pollution, Hazardous Waste, or other rules of the Department of Environmental Protection, applicable to the facility shall be complied with at the effective date. New reulations are effective upon publication in the New Jersey Register or as otherwise indicated in the Notice of Adoption in the New Jersey Register.

22) Early Expiration of Permit

If, for any reason, the facility ceases to be operated on a continuous basis and/or ceases to be operated by the owners or operators listed in the IWMF permit application, the permit expires of its own accord and remains ineffective until reissuance by the Department.

APPENDIX II

Closure Plan for Aeration Basins - February 1987

Amerada Hess (Port Reading) Corporation

CLOSURE PLAN FOR AERATION BASINS

PORT READING REFINERY

WOODBRIDGE, NEW JERSEY

February 1987

GMS & ASSOCIATES

11281 RICHMOND, BLDG. J, SUITE 100 B, HOUSTON, TEXAS 77082

EXECUTIVE SUMMARY

The Amerada Hess (Port Reading) Corporation has been operating an Advanced Industrial Wastewater Treatment System under the New Jersey Pollutant Discharge Elimination System (NJPDES). Under the NJPDES permit for the Port Reading refinery, the New Jersey Department of Environmental Protection (NJDEP) required that the Port Reading refinery submit a closure plan for the three synthetically lined aeration basins that had been used prior to the operation of the renovated treatment facility. These three basins are no longer used in the wastewater treatment system.

Analyses conducted for closure planning have demonstrated that the sediments within the basins are not governed under the federal Resource Conservation and Recovery Act (RCRA) of 40 CFR Part 261; however, the closure is regulated under NJPDES Permit No. 002878 by the Amerada Hess (Port Reading) Corporation. Therefore, Amerada Hess (Port Reading) Corporation submitted a closure plan in September of 1985 to the NJDEP for approval and comment. Subsequently, Amerada Hess (Port Reading) Corporation and NJDEP personnel have discussed the possibility of using an inert catalyst as fill material in the closure of the aeration basins. As such, the following revised closure plan replaces the September 1985 plan and reflects the use of this catalyst as a fill material.

This report addresses the closure concepts for the three aeration basins, including engineering details, sequence of closure operations, and transition of completing closure. Lastly, it contains post-closure monitoring and inspection details for assuring long term environmental protection.

EXECUTIVE SUMMARY

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AMERADA HESS (PORT READING) CORPORATION

CLOSURE OF THE AERATION BASINS

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ATTACHMENTS

AMERADA HESS (PORT READING) CORPORATION

CLOSURE PLAN FOR AERATION BASINS

1.0 INTRODUCTION

Amerada Hess Corporation operated a petroleum refinery until 1974 at Port Reading, New Jersey in Middlesex County next to the Arthur Kill. In 1974 the refinery was placed in a standby mode of operation while terminal operations were continued. As such, the New Jersey Pollutant Discharge Elimination System (NJPDES) wastewater discharge permit was changed to reflect petroleum terminal operations only; that is, the refinery wastewater system was modified to treat stormwater run-off. Three existing synthetically lined aeration basins used for biological treatment of process wastewater and stormwater for refinery operations were subsequently used as final polishing ponds for terminal stormwater run-off. These lined aeration basins received treated stormwater from the existing API separator and the corrugated plate separators which are used to capture free oil and collect petroleum hydrocarbons from the terminal operations.

In 1983, Amerada Hess Corporation applied for a revised NJPDES permit to restart the refinery operations. During 1985, ownership of the refinery site and assets were transferred from Amerada Hess Corporation to the Amerada Hess (Port Reading) Corporation. The Advanced Industrial Wastewater Treatment System is "state-of-the-art" design and was started prior to re-activation of refinery in early 1985. This current treatment system includes API oil/water separator and corrugated plate separators, an above ground equalization/surge tank and an above grade activated sludge/clarifier system with final treatment by sand filtration and activated carbon adsorption. All of these treatment units are situated on concrete pads or are concrete basins. The Advanced Industrial Wastewater Treatment System utilizes the pre-existing API and corrugated plate separators as the first operational units to collect as much oil as possible before the wastewater is sent to the equalization tank at the Advanced Industrial Wastewater Treatment System. The New Jersey Department of Environmental Protection (NJDEP) approved the permit application and issued a revised NJPDES permit to the Port Reading refinery. Since the modified wastewater treatment system included an above-ground activated sludge wastewater treatment system which replaced the aeration basins, the existing lined aeration basins were no longer needed. Therefore, NJDEP required submittal by 15 September 1985 of a closure plan for the aeration basins as part of the final NJPDES Port Reading refinery groundwater monitoring/landfarming Permit No. NJ0028878. As required, Amerada Hess (Port Reading) Corporation submitted a closure plan in September 1985 for the three aeration basins.

1.1 **Background Information** - Before 1974 the lined aeration basins were operated as extended aeration basins for biological treatment of the refinery wastewater including treated process and stormwater run-off waters. These three basins are adjoining as can be seen on the plot in Attachment No. 3. The aeration basins are located in the southeast corner of the Port Reading refinery immediately southwest of the refinery's wastewater treatment system. The basins are parallel to the southeast fence line adjoining the Public Service Electric and Gas Company (PSE&G) property and are immediately south of the Advanced Industrial Wastewater Treatment System.

The total surface area of the three basins is approximately 4.1 acres, including the surrounding dike areas. The three ponds have a combined surface water area of approximately 3.7 acres. They had an average water depth capacity of 8 feet with an average above grade dike of four feet. These basins are interconnected and were operated in series with the first basin receiving the separator liquid effluents. The first basin is the smallest of the three basins with a surface area of approximately one third of an acre. The effluent from this basin entered the adjoining second basin to the south by a submerged 24 inch pipe. The second basin has a surface water area of 1.2 acres. The effluent from this pond entered the third basin to the east by a submerged 24 inch pipe. The east basin is the largest with a surface area of approximately 2.1 acres.

1.2 **Regulatory Summary** - The aeration basins were utilized as part of the process water and stormwater management facilities over the operational history of the refinery until 1974 and for stormwater run-off (with no water from process equipment areas) through the early part of 1985. For the reasons set forth below, the aeration basins would not be considered as Treatment, Storage or Disposal (TSD) facilities under the Resource

Conservation and Recovery Act (RCRA). The aeration basins after 1974 only received treated stormwater. Before stormwater reached the aeration basins, it was treated in the API and the corrugated plate separators which are oily water separator devices in connected series. Since these basins only received treated stormwater, they would not meet RCRA definitions as TSD facilities.

In order to evaluate the detritus (bottom sediment) for closure considerations, Amerada Hess (Port Reading) Corporation has collected three representative composite bottom sediment samples from the basins in February and November 1983 and April 1985. The November test results provide the "worst case" analysis of the detritus for potential hazards since the November results were taken from the first basin. The first basin initially received all of the influents for the three basins and, due to settling, was expected to contain the highest concentrations of waste constituents. Results from the east (third) basin would provide the best case analysis, since it was the last of the three ponds to receive wastewater. Although the basins are not a regulated facility under RCRA, the February and November 1983 samples were analyzed for Extraction Procedure (E P) Toxicity in accordance with Appendix II of 40 CFR 261, to determine if the detritus would be regulated as a RCRA waste. Additionally, the November 1983 and April 1985 samples were tested for oil and grease, petroleum hydrocarbons, pH, and total lead and chromium. Based on the results of the EP Toxicity tests, the basin sediments are **non-hazardous** (see Attachment No. 2). Aeration basin sediment analyses used for closure considerations are provided in Attachment No. 2.

Since the aeration basins only received treated stormwater run-off for the last 11 years, and the basin's sediments do not meet EPA hazardous constituent levels, the closure of these basins is not subject to federal RCRA regulations. Their closure is subject to NJDEP approval in accordance with NJDEP "Compliance Schedule for NJPDES/IWMF Permit NJ 0028878", which states:

"Within six months of the Effective Date of this Permit, Amerada Hess Port Reading Refinery shall submit all plans and specifications for the closure of the three existing synthetically lined surface impoundments to this Department for review and approval. Said closure plan shall include the methodology for sampling and analyzing the liquid and solid contents of the impoundments to determine the classification and thereby the proper disposal methods for said items. Said closure plan shall also include the removal of the liners and any contaminated subsoil associated with the former surface impoundments. Infilling, regrading and final cover specifications shall also be addressed by the closure plan."

1.3 **Use of FCCU Catalyst as Fill Material** - In December of 1985, representatives of Amerada Hess (Port Reading) Corporation met with representatives of the NJDEP's Division of Waste Management regarding the use of Fluid Catalytic Cracking (FCCU) catalyst fines as fill material for the closure of the aeration basins. Correspondence relating to this and subsequent discussions is provided in Attachment No. 1. Amerada Hess (Port

Reading) Corporation believes that using the FCCU catalyst as clean fill material will effectively enhance their Waste Minimization Plan by providing for acceptable beneficial use of this non-hazardous and inert material.

GMS & Associates has estimated that approximately 30,000 cubic yards of fill will be required to establish the necessary final closure surface grade in the aeration basins area. Amerada Hess (Port Reading) Corporation is proposing that FCCU catalyst, which is presently being sent to the Edgeboro Municipal Landfill, be used as the major portion of the fill material in this closure. Using the FCCU catalyst in this manner will provide for the following environmental benefits:

- Decreases waste deposited at the municipal landfill sites. This will lessen the demand on the already decreasing capacity of municipal landfills.

- Conserves energy consumption since the material will be beneficially used as fill material on-site, i.e., there will be no further need to transport this material to Edgeboro Municipal Landfill and it will reduce the energy demands by substantially reducing trucking needs for soil from off-site sources to fill in the cleaned aeration basins.

- Will assist Amerada Hess (Port Reading) Corporation's Waste Minimization Plan efforts by using a non-hazardous and inert material as a fill material in a required closure.

The environmental benefits to be realized by this proposed closure are in accordance with the New Jersey Legislature's intent under Title 13:1E-93, which states as follows:

"The Legislature finds that New Jersey must continue to seek solutions to its energy, environmental and economic problems; that solutions to these problems require proper solid waste and resource recovery management; that the generation of municipal solid waste is increasing while landfill capacity is decreasing; that the siting of environmental secure landfills is an area of serious concern and limited choice; and that the disposal of solid waste materials is wasteful of valuable resources.

The Legislature further finds that the recycling of waste material decreases waste flow to landfill sites, recovers valuable resources, conserves energy in the manufacturing process, and offers a supply of domestic raw materials for the State's industries; that a comprehensive recycling plan and program is necessary to achieve the maximum practical recovery of reusable materials from solid waste in this State; and that such a plan will reduce the amount of waste to landfills, conserve energy and resources, and recover materials for industrial uses."

1.4 Nature of FCCU Catalyst - The FCCU catalyst by standard soil classification is characteristically a silty clay. Amerada Hess (Port Reading) Corporation has used both natural clay based catalyst and the synthetic types. Provided in Attachment No. 2 are various geophysical analyses of the spent synthetic FCCU catalyst. The catalyst particle size distribution has been analyzed to be 43.9% clay, 49.8% silt and 6.3% sand. When the catalyst is compacted at 1000 pounds per square foot, it has a hydraulic conductivity of 0.0000018 cm/sec.

Amerada Hess (Port Reading) Corporation subjected the FCCU catalyst to the Environmental Protection Agency's proposed Toxicity Characteristic Leaching Procedure (TCLP), (i.e., revised EP Toxicity test procedure) for both organic and inorganic evalution. As can be seen in the results included in Attachment No. 2, the FCCU catalyst is an inert material and qualifies under the proposed testing criteria as nonhazardous.

2.0 SITE CONDITIONS

In November 1986, GMS & Associates excavated several backhoe pits to establish the groundwater gradient for the aeration basins area. The locations and survey levels for these excavations are provided in Attachment No. 4. The expected gradient based on the November site work is to the south southeast. One important observation during the testing was that the groundwater gradient is higher than the levels of water presently in the aeration basins. As such, the basins are presently receivers of groundwater.

3.0 CLOSURE CONCEPTS

The aeration basins had been used as a polishing system for terminal stormwater run-off and use of the basins discontinued when the refinery was re-started in early 1985. The refinery process water and process area stormwater are treated in the Advanced Industrial Wastewater Treatment System. Since the effluent from these ponds met applicable permit standards prior to removal from service, the current wastewater treatment system can adequately process the remaining water within the basins.

3.1 **Closure Strategy** - After a review of available information regarding the construction and operation of the aeration basins, the following closure strategy has been developed.

1) All remaining water, including additional rainwater, will be discharged to the refinery wastewater treatment system. This includes incidental stormwater collected during the site closure and groundwater inflow into the basins. Note that this task will be ongoing throughout the closure project. Also included in this first task, Amerada Hess (Port Reading) Corporation will install four groundwater monitoring wells. Their proposed location is provided in Attachment No. 7. Their location is based on the gradients established during the November 1986 site visit. The monitoring system will include one upgradient well located to the north and three downgradient wells located to the south southeast area of the basins. These wells will be tested for the parameters under the NJPDES requirements for Discharges to Groundwater (DGW) for non-hazardous facilities under NJPDES rules. The statistical comparison methods of the background groundwater data will be the methods proposed by Amerada Hess (Port Reading) Corporation in its RCRA Part B application. These four wells should be monitored for approximately two years to document that the aeration basins did not affect the shallow groundwater in the area. Reports on this data will be presented at that time. If statistical problems occur the NJDEP will be notified and the situation will be discussed with NJDEP staff.

2) A small area in the east basin will be cleaned. Pond detritus will be removed from the east basin by a grade-all, loaded into dump trucks and taken to the existing permitted landfarm system. At the same time,

catalyst will be dewatered and mixed with compression strengthening material in an existing concrete basin. This operation will be done initially in the same concrete basin in which the catalysts are presently being mixed with cement dust prior to shipment to the Edgeboro Municipal Landfill.

3) After an area in the east basin has been prepared as discussed in Task 2, the underlying soils will be sampled in accordance with the grid in Attachment No. 5. Soils will be tested by Certified NJDEP laboratory for petroleum hydrocarbons, pH, total chromium and lead. If required, underlying soils and dike materials will be removed to the landfarms until the decontamination objectives in Section 4 of this Plan are obtained. As discussed in Section 2.0 of this report based on previous test results, it is not anticipated that any underlying soil removal will be necessary.

4) After the small area in the east basin is cleaned the conditioned catalyst and compression strengthening mixture will be placed in the cleaned portion of the east basin in lifts using an "open face" filling method. As the open face proceeds forward, the east basin will be progressively cleaned and decontaminated ahead of the filling. This operation will continue until the entire east basin is filled. Amerada Hess (Port Reading) Corporation will maintain two feet of freeboard on

the existing basin dike.

5) Amerada Hess (Port Reading) Corporation will then begin cleaning the small northwest basin. After underlying soils have been documented to meet decontamination levels, a concrete basin will be constructed to replace the concrete basin presently used to mix catalysts and cement dust. Construction details of this basin are provided in Attachment No. 6.

6) Amerada Hess (Port Reading) Corporation will clean a small section of the southwest basin in the same manner discussed in Task Nos. 2 and 3 and will place catalyst into this basin as discussed for the east basin (see discussion in Task No. 4).

7) Once the east and southwest basins are full, Amerada Hess (Port Reading) Corporation will fill the smaller Northwest basin in the same manner as the east and southwest basins.

8) When all three basins are filled, the entire surface will be shaped by adding soils to form a center mound (crest), which will have a one per cent slope in each direction as configured in Attachment No. 8. The minimum top soil cover at any location will be at least one foot thick. The final top soil cover will then be seeded with grass for erosion control.

4.0 DECONTAMINATION OBJECTIVES

It may be necessary to remove soils from the aeration basins in order to restore the area to refinery background levels. Although the aeration basin sediments are not hazardous, some of the analyses provided in Attachment No. 2 suggest that the sediments contain low levels of chromium, lead, and oil & grease which are slightly above background.

4.1 **Decontamination Parameters** - Should cleanup of underlying soil be necessary, cleanup should only be required to the extent that the soils were affected by the operation of these basins. As such, decontamination of soils influenced by operation of the basins to refinery background levels for representative constituents is appropriate. Based on the analytical data of the sediments in the aeration basins, appropriate parameters for cleanup levels would be lead, chromium, and oil & grease. The derivation of the specific objectives proposed for closure of the aeration basins are as follows:

4.1.1 **Background Levels** - A general range for background oil & grease, lead and chromium levels can be established by examination of pertinent literature.

- Metals - Both lead and chromium are metals occurring naturally in soils. The natural ranges for background values reported for lead and chromium are as shown in Table 1:

TABLE 1 - BACKGROUND LEVELS OF SOIL METALS

METAL	EPA *	OVERCASH**
Lead (ppm)	5 to 150	2 to 200
Chromium (ppm)	2 to 250	5 to 300

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* EPA, "Land Disposal of Hazardous Waste" , EPA 600/9-82-002, March 1982.

**Overcash, M.R. and Pal, D., Land Treatment Systems for Industrial Waste, Ann Arbor Science, 1979.

- Oil & Grease - Humic substances occur naturally in soils at average concentrations of about 2 percent by weight. Since some of this material is extractable under the test methods for oil & grease, there is a background value for this parameter in soils, that is, some natural humic materials will report as oil & grease. They are not from pollution or refinery sources. Little data is available to establish a reasonable range of oil & grease in background refinery soils; however, the same EPA references in Table 1 indicates values of 500 to 4300 ppm as refinery background.

4.1.2 Criteria Development - Using the general background ranges developed from the above references, subsurface soil samples from the area north of the wastewater treatment plant were collected and analyzed to develop site specific background ranges. These results are shown in Table 2 as follows:

TABLE 2 - PORT READING REFINERY BACKGROUND SOIL LEVELS AND LITERATURE RANGES

Parameter	Refinery Ranges	Literature Ranges
Lead (ppm)	47 to 317	2 to 200
Chromium (ppm)	37 to 134	2 to 300
Oil & Grease (ppm)	2560 to 4260	500 to 4300

Past metallurgical activities of other companies in the industrial area around the Amerada Hess (Port Reading) Corporation refinery have emitted significant amounts of metals and which result in metal levels (as expected) from the middle of the literature background ranges to slightly above the upper end. Therefore, the following levels are suggested as closure objectives:

1) Lead at less than 300 ppm

2) Chromium at less than 300 ppm

3) Oil & Grease at less than 4000 ppm

As described above in Task Nos. 3 and 5, all soils and dike materials which contain levels of the test parameters above the decontamination objectives will be removed and landfarmed in the North and the No. 1 Landfarm. Materials below these levels will be left in place.

5.0 CLOSURE INFORMATION

5.1 **Notification to NJDEP** - Amerada Hess (Port Reading) Corporation will submit a Closure Decontamination Report to the NJDEP within sixty days of completing the final site decontamination for all three basins. This report will include management and professional engineering certifications, with results of underlying soil analyses at the aeration basins.

5.2 **Safety** - Worker protection will be provided for the personnel directly involved with closure activities in accordance with applicable statutes and regulations. Depending upon the degree of contact, protective clothing and/or respirators for dust emissions will be made available if warranted.

5.3 **Estimated Volume of Detritus** - GMS & Associates has estimated that the basins contain approximately 7,500 to 10,000 cubic yards of wet sediments. These sediments are predominately water and, as noted, are nonhazardous.

5.4 **Closure Schedule** - The closure decontamination period of the aeration basins will be done in stages. The first stage will be to complete de-watering and then remove pond sediments from the east basin. GMS & Associates has estimated that closure of the East basin will take two to four years to complete, depending on the volume of compression strengthening material added to the FCCU catalyst. The time estimate is based on the volume of FCCU catalyst produced on an annual basis. The scheduled time for cleaning and filling the two westerly basins has been estimated at two to three years. The sequence of events will follow the discussion in Section 3.1, and GMS has estimated that the total aeration basin closure will take approximately five to nine years to complete.

6.0 POST CLOSURE CARE

The aeration basins were lined with a synthetic liner. Field observations indicate that the liner above the normal water level has deteriorated to a degree, but the liner below the normal water level is predominately in good shape, which is evident by the numerous gas pockets discovered under the liner.

Amerada Hess (Port Reading) Corporation will install four groundwater monitoring wells adjacent to the aeration basins. Amerada Hess is proposing two years of quarterly groundwater monitoring of these wells. The first year will be to establish the background means and the second year will be used to compare the upgradient well to the downgradient wells. Amerada Hess (Port Reading) Corporation is proposing that the statistical comparison methods to be used be those that were submitted in the facility's RCRA Part B application. Provided in Attachment No. 9 are the referenced statistical methods.

6.1 **Post Closure Inspections**- After closure of all three basins, Amerada Hess (Port Reading) Corporation will inspect the final slope and cover of the basins to determine whether:

- The grade is still adequate;
- There has been any major subsidence; and
- Surface erosion is causing problems.

These inspections will continue on an annual basis for ten years after the basins are closed. All deficiencies detected will be corrected within thirty (30) days.

PORT READING

ATTACHMENT NO. 1

Correspondence Relating to Use of FCCU

Catalyst as Fill Material

CERTIFIED MAIL #P-516-789-902
RETURN RECEIPT REQUESTED

AMERADA HESS (PORT READING) CORPORATION

PHONE: (201) 636-2410
TLX: 844-112

P.O. BOX 6950
WOODBRIDGE, N.J. 07095

16 December 1985

Mr. Edward Londres
Assistant Director
Bureau of Engineering & Licensing
Division of Waste Management
NEW JERSEY DEPARTMENT of ENVIRONMENTAL PROTECTION
8 East Hanover Street
P.O. Box CN-028
Trenton, New Jersey 08625

Dear Mr. Londres:

In early December of this year, representatives of Amerada Hess (Port Reading) Corporation met with Dr. John Trela, Chief of the Groundwater Permit Section of the Division of Water Resources and his staff to discuss an emergency condition with handling non-hazardous catalyst fines at its refinery. As a result of this discussion, the Groundwater Division staff recommended that we contact your office to acquire a temporary emergency permit to deal with this material under emergency conditions.

Mr. Londres, we would appreciate a meeting to discuss this matter. Attached, please find related correspondence. Dr. Trela and/or his staff have offered to attend our meeting because of their familiarity with the Port Reading facility.

Please contact Dr. T. Helfgott, Environmental Affairs Manager for Amerada Hess Corporation or me at (201) 636-3000 to discuss this matter and to arrange for a meeting at your convenience.

Yours truly,

S. J. Breaux

S. J. Breaux

SJB:em
Copies to: R. F. Wright
R. L. Sagebien
J. Trela, NJDEP - #P 516-789-917
K. Vetter, NJDEP

FILE COPY

AMERADA HESS (PORT READING) CORPORATION

PHONE: (201) 636-2410
TLX: 844-112

P.O. BOX 6950
WOODBRIDGE, N.J. 07095

December 9, 1985

Dr. John Trela
New Jersey Department of Environmental Protection
Division of Water Resources
P. O. Box CN-029
Trenton, NJ 08625

Dear Dr. Trela:

Per your request, I am hereby submitting a written report in confirmation of discussions held in your office on December 5, 1985.

During October and November of this year, the Amerada Hess Port Reading Corporation Fluid Catalytic Cracking Unit experienced severe operating problems. These problems were of such a severe nature that the entire Refinery was shut down for approximately 25 days for repairs to the Cat Cracker. During this period, Catalyst loss reached the point where normal recovery systems became completely overloaded. Thus, on an emergency basis, Catalyst fines in slurry form from the Refinery Purge Treatment Unit were bypassed to the idle aeration basin located adjacent to the Unit. As you recall, closure plans have been submitted for this butyl rubber lined basin.

Utilization of this basin during the emergency conditions has been temporary. At the present time, decanted water from the slurry has been already processed through the Refinery's Advanced Waste Water Treatment Plant. Catalyst fines are being removed mechanically and disposed of in the Edgeboro Municipal Landfill as normal.

Dr. Trela, these Catalyst fines by all standards, are classified non-hazardous. Attached, please find a copy of a letter written to Mr. Ken Siet of your Department proposing the disposal of Catalyst fines on Refinery property. Following your recommendation, we are preparing a request to Mr. Edward Landres of the Engineering Permits and Licensing Division of NJDEP for use of the aeration basin on a temporary basis. Our intent is to file for necessary permits to dispose of Catalyst fines on Refinery property on a permanent basis.

We appreciate the opportunity to discuss our operating problems with you and your staff.

Very truly yours,

S. J. Breaux
Refinery Manager

SJB/af

cc: R. L. Sagebien
T. Helfgott

PORT READING

AMERADA HESS (PORT READING) CORPORATION

PHONE: (201) 636-2410
TLX: 844-112

P.O. BOX 6950
WOODBRIDGE, N.J. 07095

24 October 1985

Mr. Ken Siet
Staff Geologist
Water Resources Division
Bureau of Groundwater Discharge Permit
NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
P.O. Box CN-029
Trenton, New Jersey 08625

SUBJECT: PROSPECT of ONSITE DISPOSAL of INERT MATERIAL

Dear Ken:

Following our discussion with you on Thursday, 17 October 1985 when you visited the Port Reading Refinery to witness groundwater well installation at the expanded landfarm system, I am submitting herewith a request that we be allowed to dispose of on-site a clean, non-hazardous, inert sand-like material known as "cat fines."

The material called "cat fines" originates as a natural clay from Attapulgus, Georgia. In the process of converting desulfurized feedstock to the Fluid Catalytic Cracker (FCCU) Unit to gasoline and byproducts, an inert fine grained material is used to promote these alterations without this material itself taking part in the reaction; that is, it is a catalyst. Fine (smaller size particles) materials are produced from the inert particle dynamic contact. As these particles are attrited in a high temperature Fluid Bed Reactor under turbulent conditions, these fines are produced and then collected in a clarifier system. The amount of material involved is approximately two tons per day.

The cat fines have no hydrocarbons as registered by petroleum hydrocarbon analyses. The total metal content of the cat fines are listed on representative sheets entitled FCC Equalization Catalyst Analytical Data Report of the supplier, Engelhard of Edison, New Jersey. A Material Safety Data Sheet on Fluid Cracking Catalyst is also attached. The standard EP (Extraction Process) test shows no extractable metals. The material does not alter the pH of water and is non-reactive. Analyses of this material are attached. Please review the attached data on the raw material and on the cat fines so that we can discuss this matter with you.

Presently, the clay-like material in question is being shipped offsite to a landfill operation. We feel that better control with lowered disposal cost and improved environmental management can be realized if the material is handled onsite in an acceptable manner. This could be part of our waste minimization program.

As we discussed with you, there are three on site alternatives we would like to consider with you:

1. Incorporation of the material into the soil in a clean spoil part of the refinery. The material would be plowed in there and become part of the spoil area. Periodically this material is used as clean fill in the facility as needed.

2. The material could be placed in the obsolete stormwater basin and over a long period of time that basin would be filled in. Incident rain on this area passes through the on site Advanced Wastewater Treatment System.

3. Transfer the precipitated cat fines from a clarifier to the obsolete aeration basin which is presently under Closure Plans review. These basins already have membrane liners in place which would segregate the material on the surface with the ground beneath it. Water accumulation would be removed on a need basis to the equalization tank in the Advanced Wastewater Treatment System. It would take some years to fill this basin at which time the area could be closed, the area graded to manage incident rain and the area marked.

All these alternatives are better than the present method of difficult handling, shipment offsite to an overloaded sanitary landfill sites in this area.

We would greatly appreciate your handling this request expeditiously. Thank you for your consideration in this subject. Kindly call Dr. T. Helfgott, Environmental Affairs Manager, or me at (201) 636-3000 to arrange for a discussion on this subject.

Yours truly,

S. J. Breaux

S. J. Breaux
Refinery Manager

SJB/TH:em
Copies to: R. F. Wright
R. L. Sagebien

bcc: F. Pearlmutter
P. E. Pedersen
P. J. Barba/File
P. Rubbe/File

PORT READING

ENGELHARD

ENGELHARD CORPORATION
SPECIALTY CHEMICALS DIVISION
MENLO PARK, CN 28
EDISON, NEW JERSEY 08818

FCC EQUILIBRIUM CATALYST ANALYTICAL DATA REPORT

COPIES TO :
S. BREAUX E. PEDERSEN P. BARBA
C. L. VAN BRUMM R. STANKO

TECHNICAL SERVICE REP : L.W. MORRIS
TELEPHONE : 201-632-6108

DATE : 09-25-85

REFINERY : AMERADA HESS
AMERADA HESS CORP.
1 HESS PLAZA
WOODBRIDGE , NJ 07095

REFINERY UNIT NO :
UNIT DESCRIPTION : UOP SBS RISER
CATALYST INVENTORY : 225 TONS
NOMINAL UNIT CAPACITY : 45000 BPD

S. BREAUX
AMERADA HESS CORP.
1 HESS PLAZA
WOODBRIDGE , NJ 07095

FCC UNIT NO : 1092-02-1

SAMPLE			M.A.T.		PHYSICAL PROPERTIES						CHEMICAL PROPERTIES						MISC TESTS			CATALYST	REMARKS	
RECV DATE	ID	DATED	ACT	C.F.	PAR. SIZE MICRONS 0-20 WT.%	0-40 WT.%	0-80 WT.%	APS	S.A. M2/G	ABD G/CC	CU PPM	NI PPM	V PPM	FE WT.%	NA WT.%	C WT.%	AL2O3 WT%	TI WT%	RFC RATIO		FE PPM	RE WT%
0319	1	0319	76	.91	22	42	81	47	145	.70	24	735	172	.46	.35	.70	55.00	1.19		MAG-370		
0326	2	0326	73	.98	6	22	65	62	140	.91	32	787	183	.51	.38	.85	55.08	1.19				
0403	3	0329	74	.97	9	12	53	66	149	.80	27	728	128	.47	.39	.24	55.36	1.18				
0430	4	0430	74	.93	6	9	59	72	155	.85	18	761	109	.37	.31	.06	54.57	1.19	184			
0501	5	0430	75	.97	5	14	49	78	150	.85	58	749	122	.35	.26	.03	54.53	1.34	331			
0510	6	0510	76	.89	3	10	56	74	150	.87	14	759	171	.37	.37	.03	55.63	1.18				
0522	7	0520	74	.96	4	13	58	72	147	.86	16	783	288	.37	.31	.02	56.00	1.22	60		94.00	
0604	8	0603	72	.80	2	12	53	76	140	.91	17	783	336	.37	.30	.72	56.23	1.24	37		240	
0607	9	0607	71	.84	3	9	51	77	139	.88	18	774	315	.37	.30	.02	56.10	1.25	37		100	
0625	10	0624	70	.83	1	9	60	72	149	.88	23	559	368	.36	.28	.02	55.55	1.27	147	OS+680P	80.00	
0625	11	0624	73	.75	1	9	60	70	147	.91	19	559	353	.36	.25	.73	55.69	1.26	74		PURCHASED CAT.	
0719	12	0719	68	.90	0	9	49	77	138		28	606	407	.41	.35	.03	54.90	1.31				1.47
0726	13	0726	67	.81	1	6	55	76	146	.88	27	618	415	.41	.35	.03	54.76	1.32	110			1.50
0805	14	0710	69	.70	3	8	55	75	159	.91	22	144	374	.39	.32	.07	54.01	1.30			DP.5618	
0805	15	0710	71	.70	1	5	46	80	157	.90	22	197	429	.38	.27	.07	54.48	1.29			DP.5620	
0805	16	0710	66	.75	3	5	53	76	158	.91	21	139	366	.38	.27	.07	53.90	1.37			DP.8647	
0805	17	0802	70	.75	2	6	51	79	143	.90	37	646	418	.43	.40	.03	55.08	1.30	74		KATALYSTIKS	
0806	18	0805	68	.89	4	8	55	75	133	.90	35	624	429	.42	.39	.02	55.01	1.30				1.28
0808	19	0808	67	.92	2	6	55	74	139	.91	38	575	408	.41	.40	.03	54.78	1.29	147			1.23
0813	20	0812	70	.88	3	8	53	76	139	.90	38	566	393	.41	.40	.02	54.50	1.30	110			1.19
0819	21	0817	70	.78	0	7	53	76	136	.90	34	548	364	.41	.33	.03	54.85	1.28	184			1.17
0820	22	0817	68	.88	4	10	53	76	141	.93	31	551	353	.40	.29	.65	54.70	1.29	147		PURCHASED	
0823	23	0822	72	.79	2	6	56	74	147	.89	35	522	333	.40	.30	.02	54.96	1.29	147			1.25
0823	24	0822	72	.82	4	10	57	74	148	.94	43	532	318	.41	.37	.86	54.84	1.30	110		PURCHASED	
0904	25	0831	69	.79	1	5	51	78	151	.93	40	519	428	.29	.49	.03	54.74	1.17	74			1.24
0907	26	0906	70	.80	4	8	52	77	138	.93	46	498	391	.39	.44	.72	54.94	1.30	110			1.19
0907	27	0906	71	.79	2	9	52	77	147	.91	48	500	396	.39	.42	.03	55.03	1.30	110			1.17
0914	28	0913	71	.84	1	7	56	74	156	.91	50	491	464	.40	.53	.02	54.55	1.30				1.10
0914	29	0913	72	.83	2	6	55	74	152	.90	45	490	434	.39	.50	.03	54.38	1.30				1.13
0923	30	0922			2	9	56	74	151	.91												

SEND SAMPLES TO : ENGELHARD CORP., CATALYST SERVICE DEPT., MENLO PARK, CN 28, EDISON, NJ 08818; (201)-321-5370

AMERADA HESS CORPORATION
ENVIRONMENTAL LABORATORY REPORT

DATE: 05/16/85
REPORT NO. RCRA/PR85/08
PAGE NO. 1/2

SUBJECT: ANALYSIS OF CATALYST FINES (Collector's Sample No. CAT-2) FROM

AMERADA HESS CORP.
PORT READING REFINERY
CLIFF ROAD
PORT READING, N. J. 07064

ANALYSES REQUESTED: EP Toxicity and Oil & Grease.

I. RESULTS OF EP TOXICITY ANALYSIS (Method of Addition)

DATE SAMPLED	SAMPLE SOURCE	LAB CODE	Ag	As	Ba	Cd	Cr	Cr+6	Hg	Pb	Se
		(Max. conc.	5.0	5.0	100.0	1.0	5.0	---	0.2	5.0	1.0)
5-07-85	CATALYST FINES 1700 UNIT	6B	<5.0	<5.0	<5.0	<1.0	<5.0	---	<0.2	<5.0	<1.0

METAL CONCENTRATIONS (MG/L)

II. RESULTS OF ADDITIONAL TEST ANALYSES

LAB CODE	OIL & GREASE (WET WT. %)
6B	none visible

PORT READING

DATE: 05/16/85
REPORT NO. RCRA/PRES/08
PAGE NO. 2/2

CUSTODY INFORMATION

SAMPLE COLLECTOR.................F. Kubte
COLLECTOR'S SAMPLE NO...........Cat-2
SAMPLES SHIPPED TO LAB.........05/07/85
DATE SAMPLES RECEIVED BY LAB...05/07/85
INCLUSIVE DATES OF ANALYSIS....05/07/85 - 05/09/85
ANALYSIS PERFORMED BY...........J. Barnes

PROCEDURE REFERENCES AND INSTRUMENTATION USED

METHOD	INSTRUMENTATION
RCRA 1310. E.P. Toxicity Test Method	
RCRA 7060. Arsenic (furnace)	P.E. 503 HGA 2100
RCRA 7080. Barium (flame)	P.E. 503 AAS
RCRA 7130. Cadmium (flame)	P.E. 503 AAS
RCRA 7190. Chromium (flame)	P.E. 503 AAS
RCRA 7420. Lead (flame)	P.E. 503 AAS
RCRA 7471. Mercury (vapor)	VARIAN 475 AAS
RCRA 7740. Selenium (furnace)	P.E. 503 HGA 2100
RCRA 7760. Silver (flame)	P.E. 503 AAS
STD METHODS 503 D. Oil & Grease (gravimetric)	

PORT READING

AMERADA HESS CORPORATION
ENVIRONMENTAL LABORATORY REPORT

DATE: 05/16/85
REPORT NO. RCRA/PRES/05
PAGE NO. 1/2

SUBJECT: ANALYSIS OF CATALYST FINES (Collector's Sample No. CAT-1) FROM

AMERADA HESS CORP.
PORT READING REFINERY
CLIFF ROAD
PORT READING, N. J. 07064

ANALYSES REQUESTED: EP Toxicity and Total Petroleum Hydrocarbons

I. RESULTS OF EP TOXICITY ANALYSIS (Method of Addition)

DATE SAMPLED	SAMPLE SOURCE	LAB CODE	Ag	As	Ba	Cd	Cr	Cr+6	Hg	Pb	Se
			METAL CONCENTRATIONS (MG/L)								
	(Max. conc.)		5.0	5.0	100.0	1.0	5.0	---	0.2	5.0	1.0
3-2?-85	CATALYST FINES FCC UNIT	62	<0.1	<0.01	<3.7	<0.1	<0.4	---	<0.01	<0.8	<0.01

II. RESULTS OF ADDITIONAL TEST ANALYSES

LAB CODE	PETROLEUM HYDROCARBONS (WET WT. %)
62	<0.01

PORT READING

[illegible] INFORMATION

SAMPLE COLLECTOR.................F. Kubbe
COLLECTOR'S SAMPLE NO...........Cal-1
SAMPLES SHIPPED TO LAB..........03/27/85
DATE SAMPLES RECEIVED BY LAB...03/27/85
INCLUSIVE DATES OF ANALYSIS....03/27/85 - 05/06/85
ANALYSIS PERFORMED BY...........Matthew J. Benning
Bruce K. Schmidt

PROCEDURE REFERENCES AND INSTRUMENTATION USED

METHOD	INSTRUMENTATION
RCRA 1310, E.P. Toxicity Test Method	
RCRA 7060, Arsenic (furnace)	P.E. 500 HGA 2100
RCRA 7080, Barium (flame)	P.E. 500 AAS
RCRA 7130, Cadmium (flame)	P.E. 500 AAS
RCRA 7190, Chromium (flame)	P.E. 500 AAS
RCRA 7420, Lead (flame)	P.E. 500 AAS
RCRA 7470, Mercury (vapor)	VARIAN 475 AAS
RCRA 7740, Selenium (furnace)	P.E. 500 HGA 2100
RCRA 7760, Silver (flame)	P.E. 500 AAS
STD METHODS 503 A, Oil & Grease (gravimetric)	
EPA 418.1, Petroleum Hydrocarbons, Total Recoverable	P.E. 2[illegible]7 IR

TPH/85/081
DATE
6/5/85

AMERADA HESS CORPORATION

INTEROFFICE CORRESPONDENCE

TO: Dr. T. Helfgott

FROM: Mr. T. P. Hrycyshyn

SUBJECT: Analysis of Catalyst Fines (Collector's Sample No. PTU-1) Report No. RCRA/PR85/08 from

Amerada Hess Corp.
Port Reading Refinery
Cliff Road
Port Reading, NJ 07064

Analyses Requested: Oil & Grease, Percent Solids

Date Sampled	Sample Source	Lab Code	Oil & Grease (Wet Wt. %)	Percent Solids*
5/10/85	1800 Unit	69	<0.1	37.4

* water decanted

Custody Information

Sample Collector	P. Rubbe
Collector's Sample No.	PTU-1
Samples Shipped to Lab	05/13/85
Date Samples Received by Lab	05/13/85
Inclusive Dates of Analysis	05/13/85 - 06/05/85
Analysis Performed by	B.R. Schmidt, T.P. Hutchinson

Procedure References Used

Method

STD Methods 502 D. Oil & Grease (gravimetric)

T P Hrycyshyn
T. P. Hrycyshyn

TPH/kj

cc: J.J. Koval
J.R. Novak
R.H. Linskie
P. Rubbe

ENGELHARD

MAGNASIV®-370

FLUID CRACKING CATALYST

Description

MAGNASIV®-370 catalyst is a high activity, high stability zeolitic fluid cracking catalyst. The MAGNASIV catalyst series was designed for improved selectivity and cost effectiveness in both gas oil and resid applications. MAGNASIV-370 catalyst maintains the excellent octane, low bottom selectivity and attrition resistance of Engelhard's cracking catalysts, as well as unsurpassed activity maintenance under conditions of metals contamination. The MAGNASIV series is one of the family of catalysts produced by Engelhard's patented in-situ zeolitic synthesis process.

Typical Benefits

- High Activity
- Improved Cost Effectiveness
- High Hydrothermal Stability
- Superior Attrition Resistance
- Superior LCO Selectivity
- Low Bottoms Selectivity
- Low Gas Selectivity
- Low Coke Selectivity
- High LCO Cetane
- Low Bottoms Gravity
- Partial CO Combustion
- Reduced SO_x Emissions
- High Vanadium Tolerance
- High Octane

Typical Properties

CHEMICAL	
Al_2O_3, Wt. %	51
SiO_2, Wt. %	42
TiO_2, Wt. %	2
Other, Wt. %	Balance
PHYSICAL	
Ignition Loss, Wt. %	10
Apparent Bulk Density, g/cc	1.0
Engelhard Attrition Index, % Loss/Sec.	0.5
Particle Size Distribution, Wt. %:	
-20 microns	2
-40 microns	13
APS, microns	69
ENGELHARD MICROACTIVITY, WT. % CONVERSION	
Pretreatment	
1400°F/4 hrs./100% steam	80
1450°F/4 hrs./100% steam	75
1500°F/4 hrs./100% steam	67

C/O = 5; WHSV = 15, Reactor = 910° F
Mid Continent Feed

ENGELHARD
MINERALS & CHEMICALS DIVISION
MENLO PARK, CN 28, EDISON, NJ 08818
TELEPHONE (201) 321-5000

SPECIALTY CHEMICALS DIVISION

R SION DATE September 17, 1982

Essentially similiar to OSHA-20

MATERIAL SAFETY DATA SHEET

Section I

MANUFACTURER'S NAME ENGELHARD CORPORATION SPECIALTY CHEMICALS DIVISION	EMERGENCY TELEPHONE NUMBER (201) 321-5000
ADDRESS (Number, Street, City, State and ZIP Code) MENLO PARK CN 28, EDISON, N.J. 08818	
CHEMICAL NAME AND SYNONYMS FLUID CRACKING CATALYST	TRADE NAME AND SYNONYMS HFZ SERIES, HEZ SERIES, EPZ SERIES ULTRASIV SERIES, OCTISIV SERIES, MAGNASIV SERIES
CHEMICAL FAMILY KAOLIN CLAY	FORMULA $Al_2O_3/SiO_2 2H_2O$

Section II — HAZARDOUS INGREDIENTS

PAINTS, PRESERVATIVES & SOLVENTS

PIGMENTS	%	TLV (Units)	SOLVENTS	%	TLV (Units)
N.A.			N.A.		
CATALYST N.A.			ADDITIVES N.A.		
VEHICLE N.A.			OTHERS N.A.		

Section III — PHYSICAL DATA as assigned Catagory D.

BOILING POINT (°F)	NON-VOLATILE SOLID	SPECIFIC GRAVITY (H_2O =1)	2.5-2.7
VAPOR PRESSURE (mm Hg.)	NEGLIGIBLE	PERCENT VOLATILE BY VOLUME (%)	6-13%
VAPOR DENSITY (AIR =1)	NON-VOLATILE SOLID	EVAPORATION RATE (.......................=1)	NEGLIGIBLE
SOLUBILITY IN WATER	INSOLUBLE		
APPEARANCE AND ODOR	WHITE POWDER,		
	ODORLESS		

Section IV — FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (METHOD USED) N.A.	FLAMMABLE LIMITS N.A.	Lel	Uel
EXTINGUISHING MEDIA N.A.			
SPECIAL FIRE FIGHTING PROCEDURES NONE			
UNUSUAL FIRE AND EXPLOSION HAZARDS NONE			

This Material Safety Data Sheet is furnished without charge to responsible persons who use it at their discretion and risk. Although the information and suggestions contained herein have been compiled from sources believed to be reliable, there is no warranty of any kind express or implied, as to the completeness or accuracy thereof.

PORT READING

April 24 17/1101254

AMERADA HESS (PORT READING) CORPORATION

PHONE: (201) 636-2410
TLX 844-112

P.O. BOX 6950
WOODBRIDGE, N.J. 07095

December 9, 1985

R 145 785 964

Dr. John Trela
New Jersey Department of Environmental Protection
Division of Water Resources
P. O. Box CN-029
Trenton, NJ 08625

Dear Dr. Trela:

Per your request, I am hereby submitting a written report in confirmation of discussions held in your office on December 5, 1985.

During October and November of this year, the Amerada Hess Port Reading Corporation Fluid Catalytic Cracking Unit experienced severe operating problems. These problems were of such a severe nature that the entire Refinery was shut down for approximately 25 days for repairs to the Cat Cracker. During this period, Catalyst loss reached the point where normal recovery systems became completely overloaded. Thus, on an emergency basis, Catalyst fines in slurry form from the Refinery Purge Treatment Unit were bypassed to the idle aeration basin located adjacent to the Unit. As you recall, closure plans have been submitted for this butyl rubber lined basin.

Utilization of this basin during the emergency conditions has been temporary. At the present time, decanted water from the slurry has been already processed through the Refinery's Advanced Waste Water Treatment Plant. Catalyst fines are being removed mechanically and disposed of in the Edgeboro Municipal Landfill as normal.

Dr. Trela, these Catalyst fines by all standards, are classified non-hazardous. Attached, please find a copy of a letter written to Mr. Ken Siet of your Department proposing the disposal of Catalyst fines on Refinery property. Following your recommendation, we are preparing a request to Mr. Edward Landres of the Engineering Permits and Licensing Division of NJDEP for use of the aeration basin on a temporary basis. Our intent is to file for necessary permits to dispose of Catalyst fines on Refinery property on a permanent basis.

We appreciate the opportunity to discuss our operating problems with you and your staff.

Very truly yours,

S. J. Breaux

S. J. Breaux
Refinery Manager

SJB/af

cc:. R. L. Sagebien
T. Helfgott

2

PORT READING

ATTACHMENT NO. 2

ANALYTICAL RESULTS

PORT READING

Technical Report

for

AMERADA HESS

P.O. BOX 6950

1 HESS PLAZA

WOODBRIDGE, NJ 07095

AB

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
N4475	AMERADA HESS	AHCPTRDTCL	31S-1816	860820	0800	

John J. Fitzgerald

Vice President
Research and Operations

This Tech[illegible]ical Report is an INSITE[SM] ser[illegible] [illegible]LODESTAR[SM] Data Management Software.

PORT READING

SUMMARY OF ANALYTICAL RESULTS ON AERATION BASINS

PARAMETER	East Basin 02/10/83	First Basin 11/03/83	First Basin 4/25/85
EP Toxicity (mg/l)			
• Ag	<0.1	<0.1	NT
• Cd	<0.1	<0.1	NT
• Ba	<1.0	<1.0	NT
• Pb	<0.1	<0.1	NT
• Cr	<0.1	<0.1	NT
• Se	<0.1	<0.1	NT
• As	<0.1	<0.1	NT
Total Metals (mg/kg dry wt.)			
• Pb	<1	267	184
• Cr	6	521	541
Total Metals (ppm wet wt.)			
• Pb	<1	39	82
• Cr	<1	76	240
pH (s.u.)	NT	7.4	7.1
Petroleum Hydrocarbons (% Dry Wt.)	NT	2.36	3.84
Oil & Grease (% Dry Wt.)	NT	2.68	NT
Weight % Water	NT	85.5	55.5
Volume Reduction on Drying @ 100 %C	NT	77.0	36

NT= Not Tested

Deuel and Zahray Laboratories, Inc.

P.O. Box 3006
College Station, TX 77841

Telephone
(409) 693-3111

August 19, 1986

GMS

FCC Sludge

pH.............................8.3
Field Moisture................66.7%
Particle Density..............2.49 g/cm^3
Bulk Density..................0.80 g/cm^3

Plastic Limit.................44.5%
Liquid Limit..................55.7%

Hydraulic Conductivity

cm/sec - all material compacted at 1000 lb/ft^2

Air Dried Material............................1.8×10^{-5} cm/sec
Air Dried Material + 5% Portland Cement........2.2×10^{-5} cm/sec
Air Dried Material + 10% Portland Cement.......1.3×10^{-5} cm/sec

Unconsolidated Compressive Strength
(by Pocket Penetrometer) $Tons/ft^2$

Air Dried Material...............................4.25 $Tons/ft^2$
Air Dried Material + 5% Portland Cement............4.25 $Tons/ft^2$
Air Dried Material + 10% Portland Cement...........3.75 $Tons/ft^2$

Particle Size Distribution

Sand	Silt	Clay
	%	
6.3	49.8	43.9

Robert K. Zahray
Robert K. Zahray
Laboratory Manager

PORT READING

SEP 24, 1986

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

TCLP - Volatiles - GC/MS Analysis (QR65)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
N4475	AMERADA HESS	AHCPTRDTCL	31S-1816	860820	0800	

Compound	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
	Sample Concen. ug/l	MDL ug/l	First ug/l	Second ug/l	Blank Data ug/l	Concen. Added ug/l	% Recov	Unspiked Sample ug/l	Concen. Added ug/l	% Recov
Acrylonitrile	ND	100	ND	ND	ND	80.0	89	ND	80.0	140
Benzene	ND	4.4	ND	ND	ND	18.0	101	ND	18.0	110
Carbon disulfide	ND	10	ND	ND	ND	18.0	93	ND	18.0	109
Carbon tetrachloride	ND	2.8	ND	ND	ND	18.0	98	ND	18.0	103
Chlorobenzene	ND	6.0	ND	ND	ND	18.0	98	ND	18.0	110
Chloroform	22.8	1.6	22.8	22.9	ND	18.0	93	27.4	18.0	113
1,2-Dichloroethane	ND	2.8	ND	ND	ND	18.0	90	ND	18.0	118
1,1-Dichloroethylene	ND	2.8	ND	ND	ND	18.0	96	ND	18.0	111
Isobutyl alcohol	ND	8.0	ND	ND	ND	200	86	ND	200	145
Methylene chloride	57.8	2.8	57.8	109	5.97	18.0	90	26.2	18.0	204a
Methyl ethyl ketone	BMDL	10	7.70	5.48	36.8	90.0	60	9.64	90.0	89
Pyridine	ND	80	ND	ND	ND	200	72	ND	200	98
1,1,1,2-Tetrachloroethane	ND	10	ND	ND	ND	50.0	97	ND	50.0	106
1,1,2,2-Tetrachloroethane	ND	6.9	ND	ND	ND	18.0	99	ND	18.0	134
Tetrachloroethylene	ND	4.1	ND	ND	ND	18.0	97	ND	18.0	114
Toluene	ND	6.0	ND	ND	ND	18.0	97	ND	18.0	110
1,1,1-Trichloroethane	ND	3.8	ND	ND	ND	18.0	102	ND	18.0	108
1,1,2-Trichloroethane	ND	5.0	ND	ND	ND	18.0	95	ND	18.0	109
Trichloroethylene	ND	1.9	ND	ND	ND	18.0	97	ND	18.0	101
Vinyl chloride	ND	10	ND	ND	ND	18.0	93	ND	18.0	121

a Spiked samples that contain compounds present at high levels do not provide valid spike recovery data.

PORT READING

ETC ENVIRONMENTAL TESTING and CERTIFICATION

SEP 21, 1986

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

TCLP - Base Neutral/Acid - GC/MS ANALYSIS (QR66)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
N4475	AMERADA HESS	AHCPTRDTCL	31S-1816	860820	0800	

Compound	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
	Sample Concen. ug/l	MDL ug/l	First ug/l	Second ug/l	Blank Data ug/l	Concen. Added ug/l	% Recov	Unspiked Sample ug/l	Concen. Added ug/l	% Recov
bis(2-Chloroethyl) ether	ND	5.7	ND	ND	ND	100	69	ND	100	81
o-Cresol	ND	10	ND	ND	ND	100	67	ND	100	70
m+p-Cresols	ND	10	ND	ND	ND	200	63	ND	200	64
1,2-Dichlorobenzene	ND	1.9	ND	ND	ND	100	81	ND	100	84
1,4-Dichlorobenzene	ND	4.4	ND	ND	ND	100	85	ND	100	87
2,4-Dinitrotoluene	ND	5.7	ND	ND	ND	100	93	ND	100	93
Hexachlorobenzene	ND	1.9	ND	ND	ND	100	84	ND	100	140
Hexachlorobutadiene	ND	.90	ND	ND	ND	100	98	ND	100	85
Hexachloroethane	ND	1.6	ND	ND	ND	100	102	1.14	100	80
Nitrobenzene	ND	1.9	ND	ND	ND	100	82	ND	100	79
Pentachlorophenol	ND	2.6	ND	ND	ND	100	117	ND	100	78
Phenol	2.43	1.5	ND	ND	ND	100	38	ND	100	42
2,3,4,6-Tetrachlorophenol	ND	10	ND	ND	ND	100	75	ND	100	76
2,4,5-Trichlorophenol	ND	10	ND	ND	ND	100	80	ND	100	78
2,4,6-Trichlorophenol	ND	2.7	ND	ND	ND	100	92	ND	100	94

PORT READING

ETC ENVIRONMENTAL TESTING and CERTIFICATION

SEP 19, 1986

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

TCLP - Pest & Herb Compounds - GC Analysis (QR67)

Chain of Custody Data Required for ETC Data Management Summary Reports						
N4475	AMERADA HESS	AHCPTRDTCL	31S-1816	860820	0800	
ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours

Compound	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
	Sample Concen. ug/l	MDL* ug/l	First ug/l	Second ug/l	Blank Data ug/l	Concen. Added ug/l	% Recov	Unspiked Sample ug/l	Concen. Added ug/l	% Recov
Chlordane	ND	2.2	ND	ND	ND	10	82	ND	11	87
Heptachlor	ND	.9	ND	ND	ND	2	105	ND	2	105
Endrin	ND	.9	ND	ND	ND	4[A]	103	ND	4[A]	105
Lindane	ND	.9	ND	ND	ND	4[A]	103	ND	4[A]	100
Methoxychlor	ND	2.3	ND	ND	ND	5	100	ND	5	100
Toxaphene	ND	9.0	ND	ND	ND	10	97	ND	11	106
2,4-D	ND	110	ND	ND	ND	100	45	ND	90.9	52
2,4,5-TP (Silvex)	ND	11	ND	ND	ND	10.0	103	ND	9.09	116

A Combined concentration due to coelution.

PORT READING

ETC ENVIRONMENTAL TESTING and CERTIFICATION

SEP 24, 1986
METALS

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

TCLP – Toxicity Characteristic Leaching Procedure – METALS ANALYSIS (QR68)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
N4475	AMERADA HESS	AHCPTRDTCL	31S-1816	860820	0800	

Compound	Results: Sample Concen. ug/l	Results: MDL ug/l	QC Replicate: First	QC Replicate: Second	QC Blank and Spiked Blank: Blank Data	QC Blank and Spiked Blank: Concen. Added	QC Blank and Spiked Blank: % Recov	QC Matrix Spike: Unspiked Sample	QC Matrix Spike: Concen. Added	QC Matrix Spike: % Recov
Arsenic	BMDL	20	-	-	-	-	-	-	-	-
Barium	270	3.0	-	-	-	-	-	-	-	-
Cadmium	ND	3.3	-	-	-	-	-	-	-	-
Chromium	ND	12	-	-	-	-	-	-	-	-
Lead	ND	54	-	-	-	-	-	-	-	-
Mercury	ND	2.0	-	-	-	-	-	-	-	-
Selenium	BMDL	10	-	-	-	-	-	-	-	-
Silver	ND	13	-	-	-	-	-	-	-	-
Nickel	BMDL	13	-	-	-	-	-	-	-	-
Thallium	BMDL	25	-	-	-	-	-	-	-	-

PORT READING

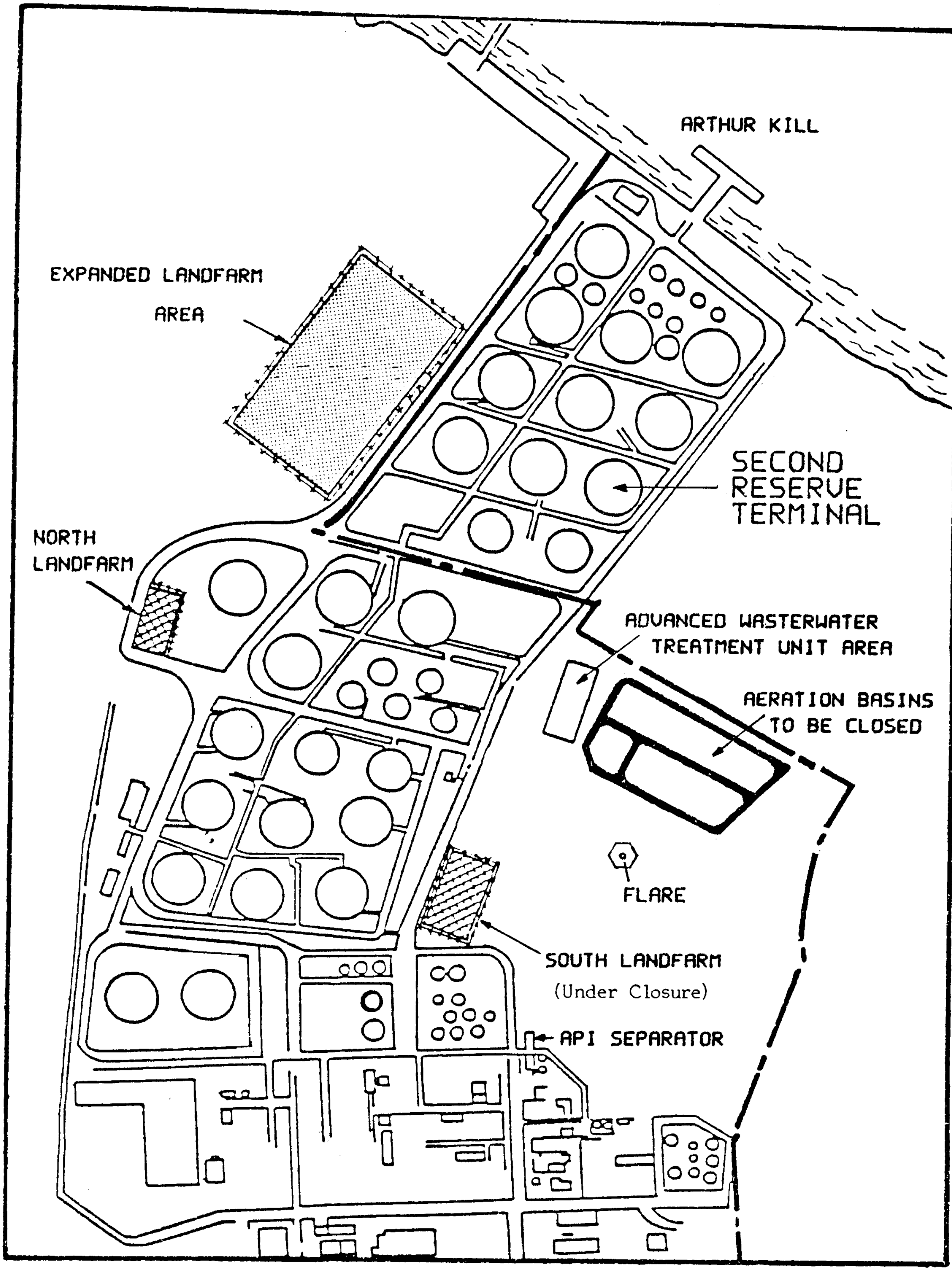
3

PORT READING

ATTACHMENT NO. 3

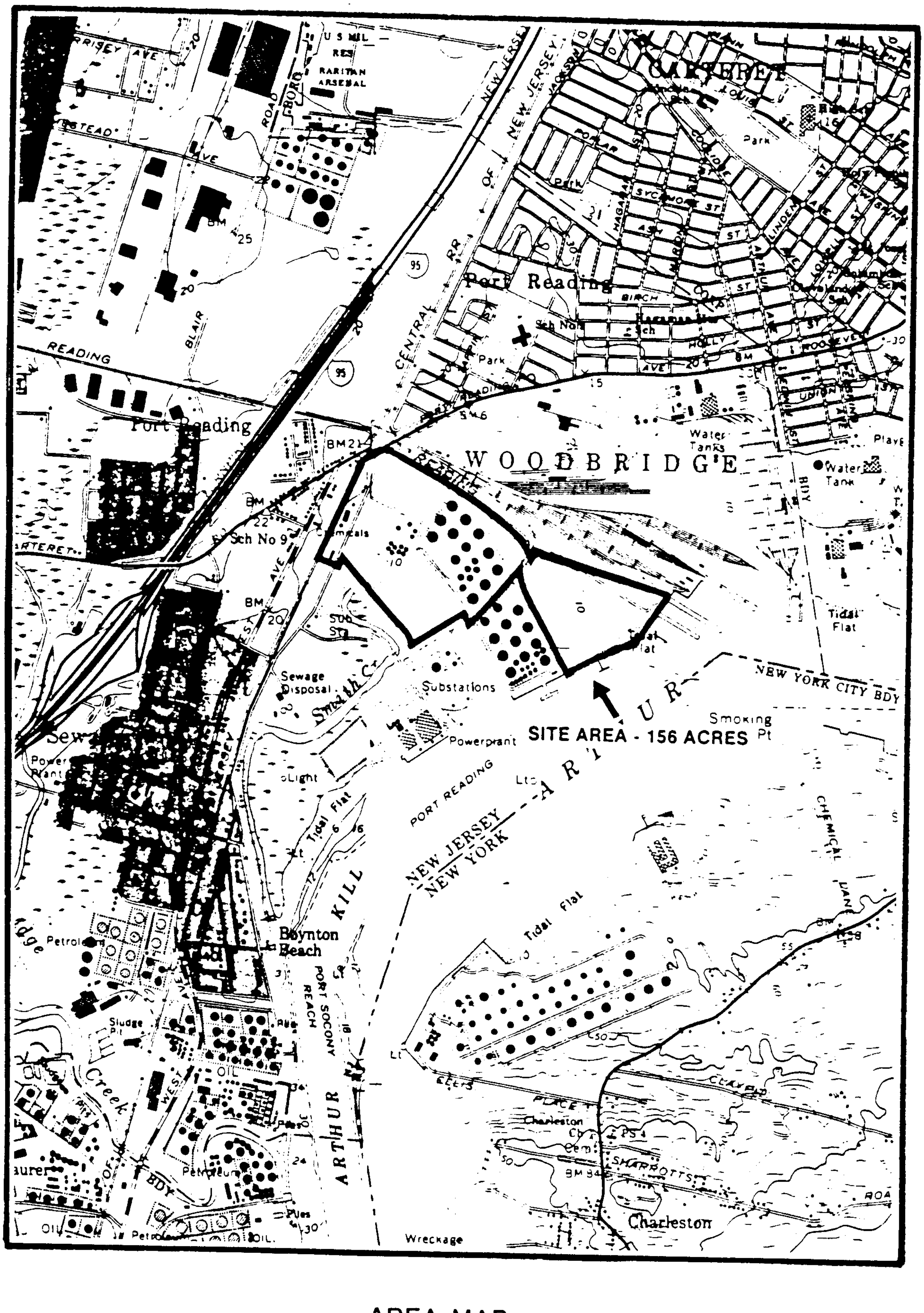
FACILITY PLOT PLAN & AREA MAP

PORT READING



AMERADA HESS PORT READING REFINERY
REFINERY PLOT PLAN SHOWING AERATION BASINS

PORT READING



AREA MAP

PORT READING REFINERY

PORT READING

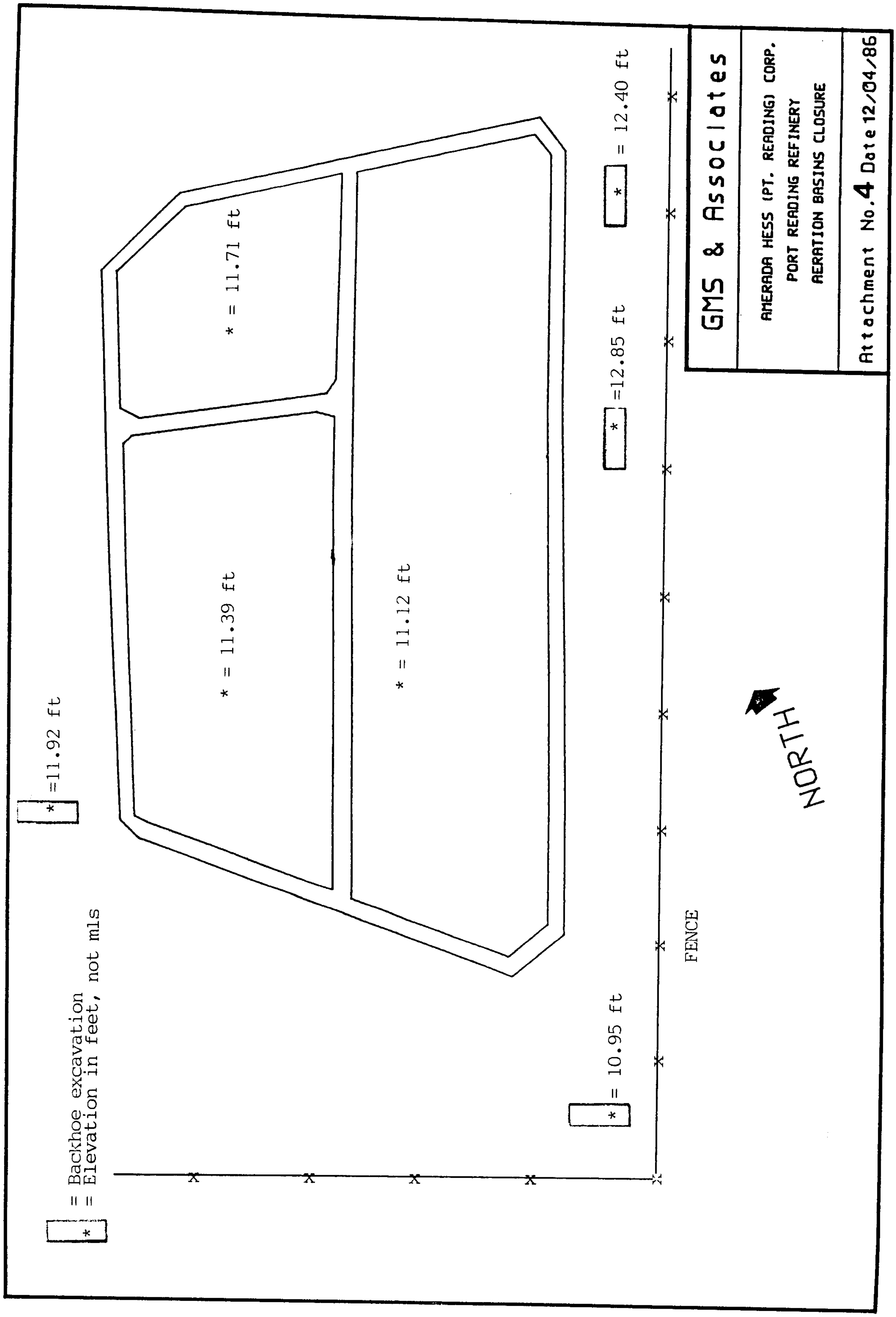
4

PORT READING

ATTACHMENT NO. 4

LOCATION & SURVEY INFORMATION

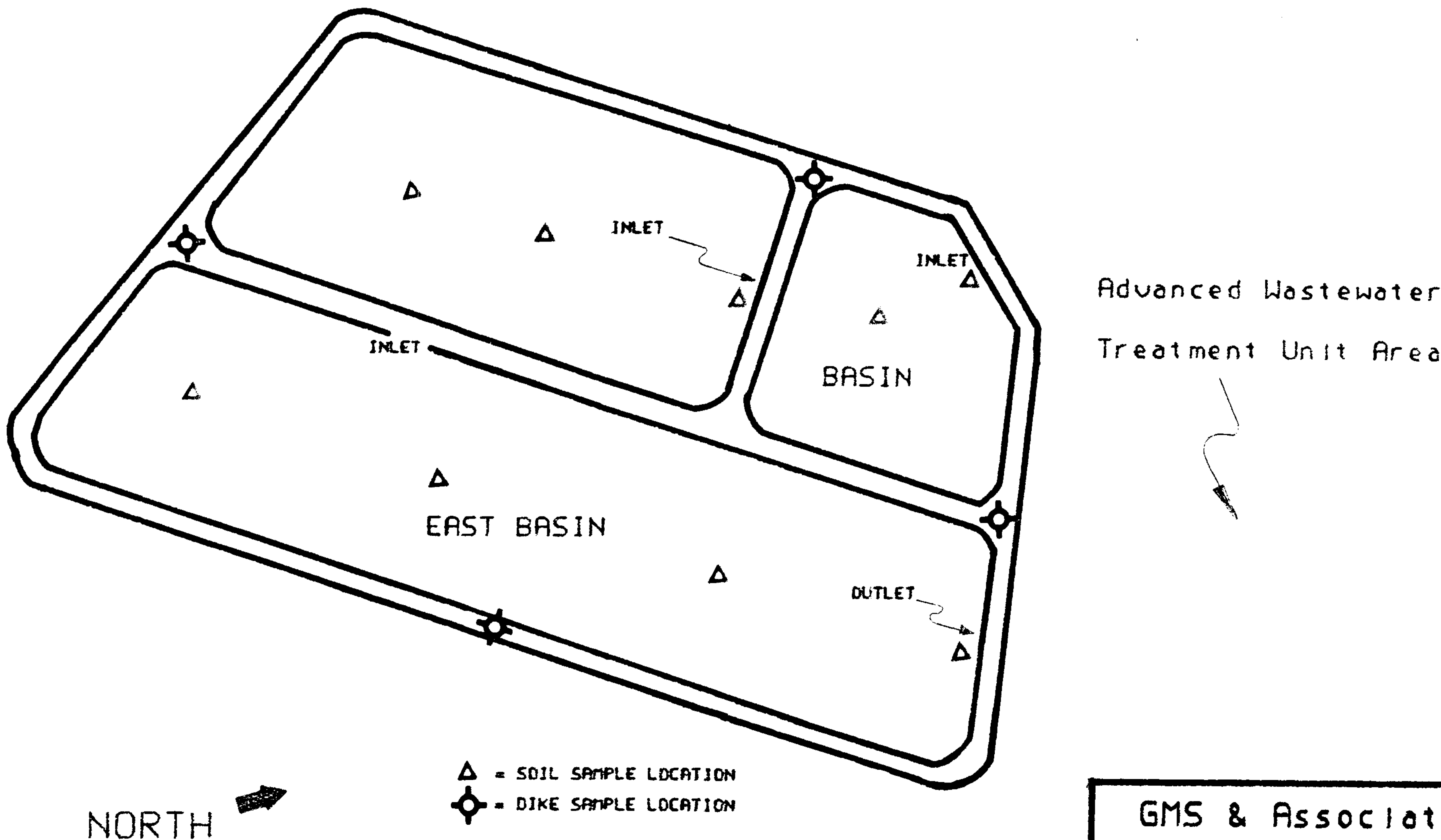
ON BACKHOE PITS



PORT READING

5

PORT READING



SAMPLE LOCATIONS FOR DECONTAMINATION OBJECTIVES

GMS & Associates

AMERADA HESS CORPORATION
PORT READING REFINERY
AERATION BASINS CLOSURE

Attachment No. 5 Date: 6/28/85

PORT READING

6

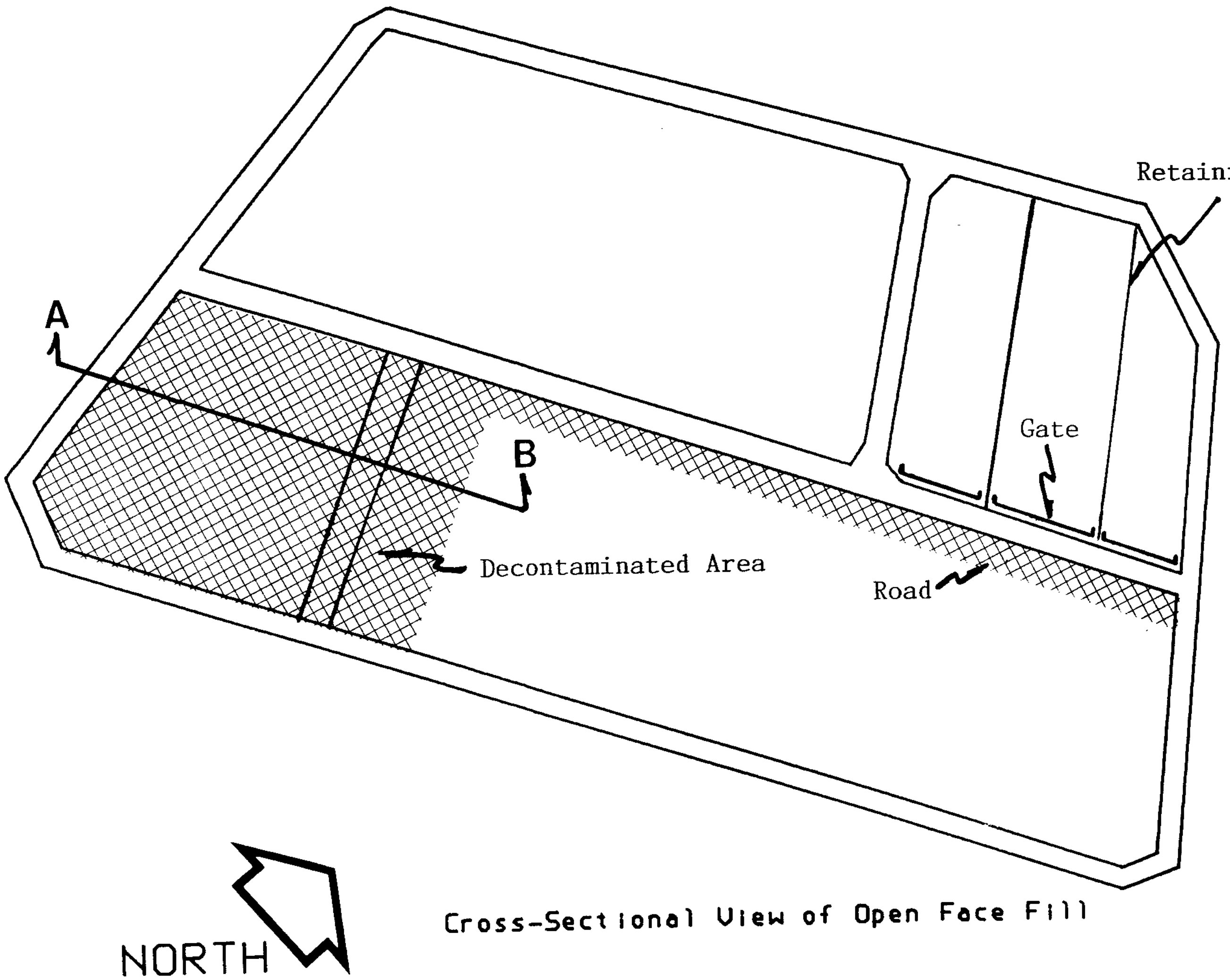
PORT READING

Attachment No. 6 - Construction Details

A.6.1 After NJDEP approval of the closure plan, de-watering in the East basin (Task No. 1 of report section 3.1) and installation of the four groundwater monitoring wells, Amerada Hess (Port Reading) Corporation will clean the northern section of the East Basin (refer to attached drawing in this attachment, see shaded area). Conditioned FCCU Catalyst will be placed into the north section of the east basin in lifts using an "Open Face Fill Method". The open face of the fill will move to the south and as it proceeds forward, the east basin will be progressively cleaned (i.e. there will always be a minimum of fifty (50) feet of "cleaned" area in front of the fill). Initially, the FCCU Catalyst will be conditioned in an existing basin.

A.6.2 Within two years of initiation of the aeration basins closure, Amerada Hess (Port Reading) Corporation will clean the small northwest basin. Then a concrete pad will be placed in the cleaned northwest basin and two retaining walls will be installed. As such, the northwest basin will be divided into three areas. On the East side of the northwest basin the existing dike will be removed and replaced by three removable gates. These three new areas in the northwest basin will operationally replace the area presently used to condition FCCU catalyst.

A.6.3 The Open Face Fill will continue until the basins are full as discussed in section 3.1 of this report. Final cover details are provided in Attachment No. 8.



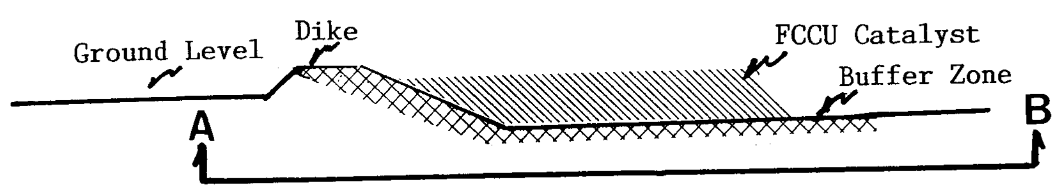
Details on FCCU Catalyst Preparation Area

1) Concrete Pad installed, after Northwest Basin is cleaned.

2) Two Retaining Walls will be installed.

3) Three Removable Gates will be installed on the East side of Northwest Basin.

Cross-Sectional View of Open Face Fill



GMS & Associates
AMERADA HESS (PT. READING) CORP. PORT READING REFINERY AERATION BASINS CLOSURE
Attachment No.6 Date:1/27/87

PORT READING

7

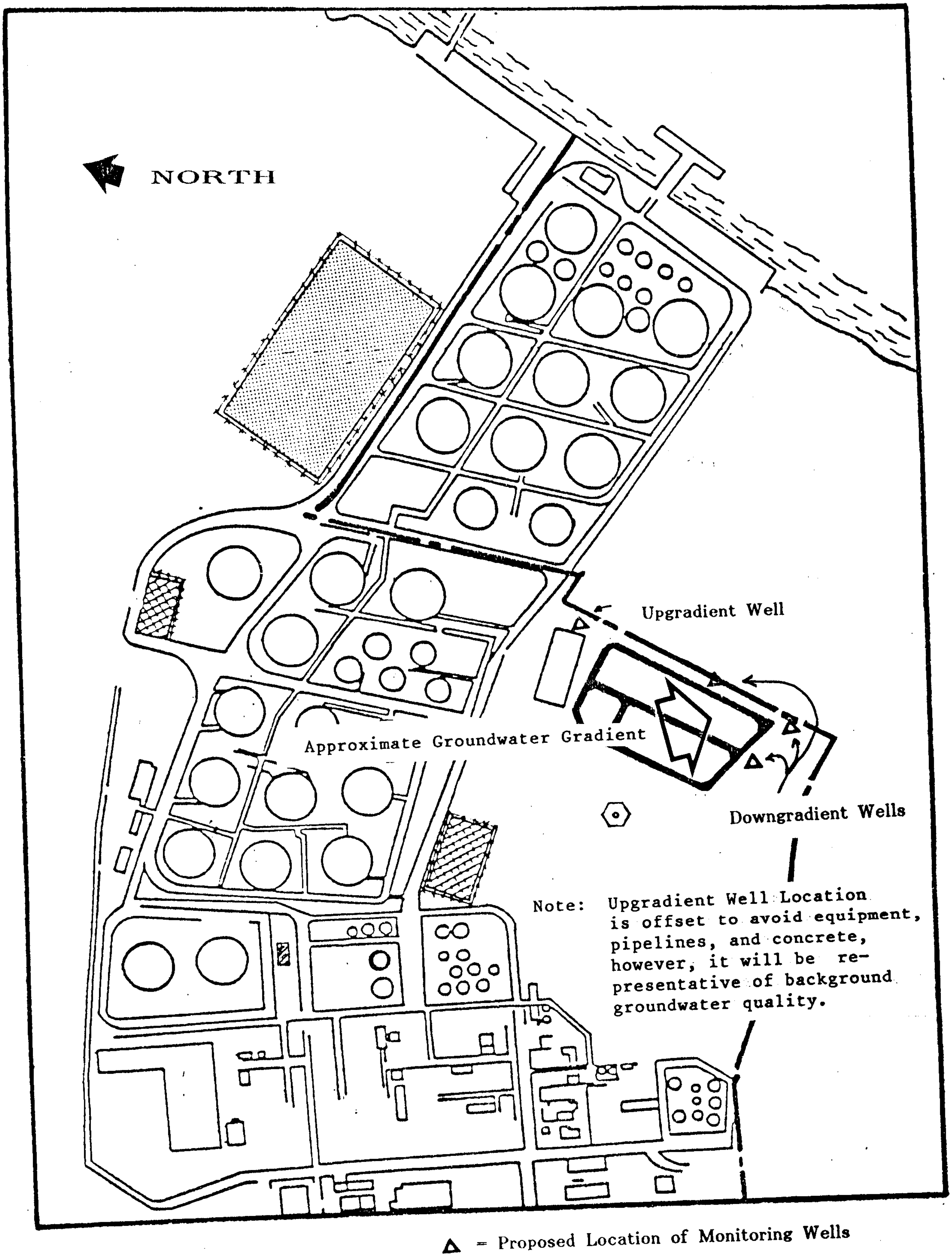
PORT READING

Attachment No. 7

A7.1 - GMS & Associates completed four test pits to determine the approximate groundwater gradient around the aeration basins. The location of the four pits is provided in Attachment No. 4. Surveyed water levels indicate that the water gradient is moving to the South Southeast. The one exception is the center pit located on the east side of the aeration basins. Field notes indicate that the pit had a clay matrix. This pit had caved in prior to conducting the water level survey and as such, the water level is an artifact (too high). GMS & Associates believes that when the pit sluffed, it did not allow the water to stablize due to the clay matrix (e.g. the clays sealed the pit when it caved in).

GMS is recommending four monitoring wells to be installed adjacent to the aeration basins. Since the gradient is to the South Southeast, the three down gradient wells should be placed southeast of the basins. To maintain safe distance from sewers, pipes and other systems the upgradient well should be set on the northeast side of the basins since the Port Reading refinery waste water treatment system is on the North and the Northwest side of the basins. This will avoid drilling through the concrete slabs used at the waste water treatment system. The proposed location for the upgradient well will still be a representative background well.

The proposed well locations are provided on the following plot.



Groundwater Monitoring Well Locations

PORT READING

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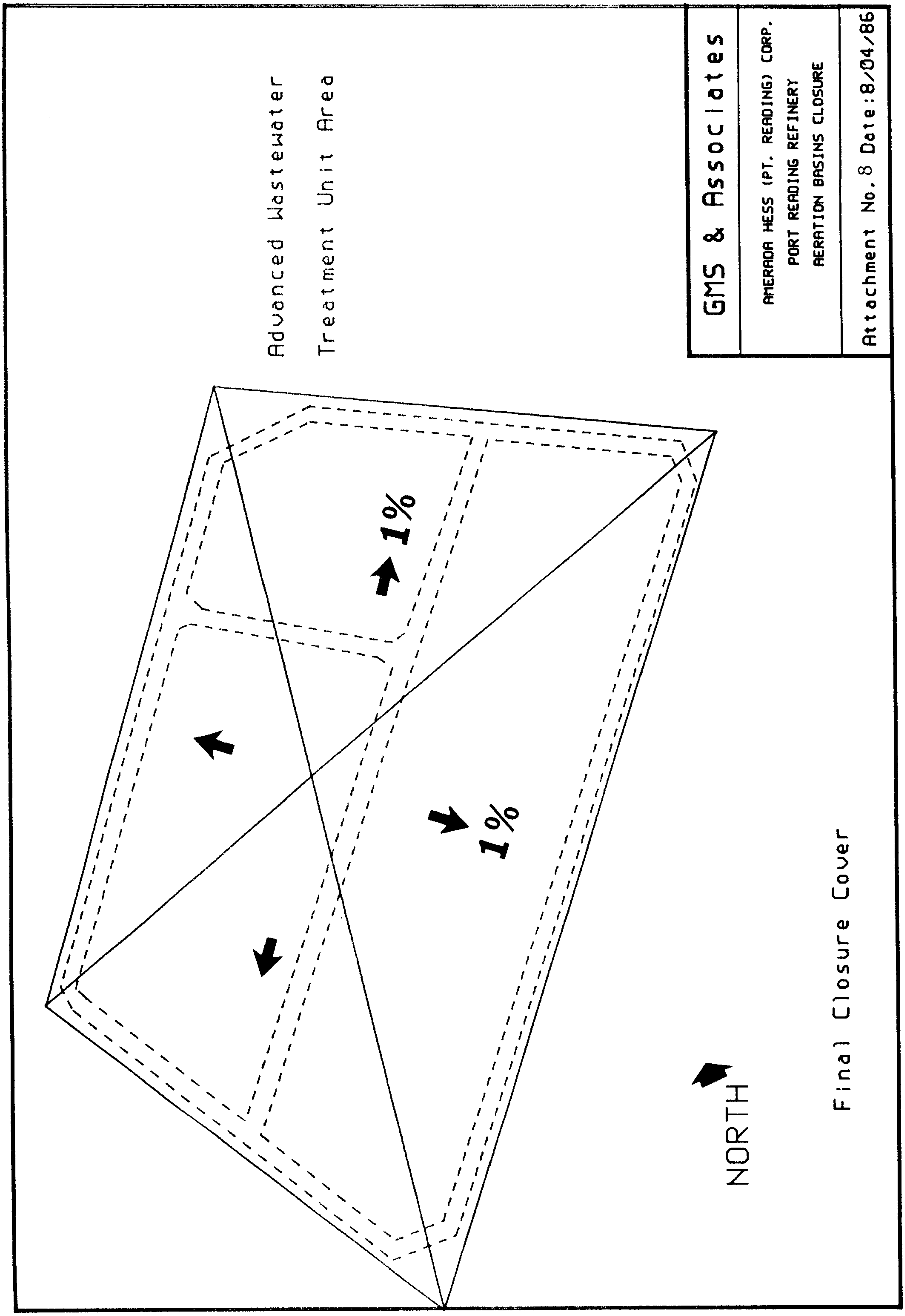
PORT READING



PORT READING

9

PORT READING

STATISTICAL PROTOCOLS FOR THE PORT READING RCRA PART B PERMIT

Prepared for:

AMERADA HESS (PORT READING) CORPORATION
Port Reading, New Jersey

Prepared by:

Michael R. Corn, P.E.

The ADVENT Group, Inc.
P. O. Box 1147
Brentwood, Tennessee 37027

March 1986

THE ADVENT GROUP, INC.

March 4, 1986

2050.05

T. Helfgott, Ph.D., P.E.
Environmental Affairs Manager
Amerada Hess Corporation
One Hess Plaza
Woodbridge, NJ 07095

SUBJECT: Report on Statistical Protocols for the Port Reading RCRA Part B Permit

Dear Dr. Helfgott:

At your request, I have prepared the enclosed report as referenced above. This report presents a statistical approach to be used at Port Reading in assessing groundwaters and unsaturated zone samples at the Resource Conservation and Recovery Act (RCRA) landfarms at the refinery. In preparing this report, we have included the methodology and approaches suggested by Dr. Robert Gibbons, Professor of Statistics at the University of Illinois at Chicago. Dr. Gibbons has reviewed the statistical approach described in Section 2 of this report.

The report includes the statistical approach. Example calculations which test the validity of the approach will be supplied at the end of the Treatment Demonstration. As we have discussed, we had some concern with the power of the original approach using the standard Mann-Whitney U test. After review of the original calculations made in September and October of last year on data from HOVIC, Dr. Gibbons recommended a modification of the Mann-Whitney U test which gives the test the necessary power required to meet the 0.01 and 0.05 levels of significance.

I have also included the recommended constituents for each environmental media (groundwaters, unsaturated zone liquids, and unsaturated zone soil cores) and the suggested media constituent concentration which would require statistical analysis for determination of significant increases over background concentrations or method detection levels.

As you review this report and the methodology, please call me at (615) 377-4775 if you should have any questions or comments.

Sincerely,

The ADVENT Group, Inc.

Michael R. Corn

Michael R. Corn, P.E.
Principal

P.O. Box 1147 • Brentwood, TN 37027 • (615) 377-4775 • Affiliated with AWARE, INC./Southwest Houston, Texas

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EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

Amerada Hess (Port Reading,) Corporation operates a landfarm system at the Port Reading Refinery located in Port Reading, New Jersey. Amerada Hess has requested a Resource Conservation and Recovery Act (RCRA) Part B Permit under the requirements of the RCRA regulations of 40 CFR 270 and 264. Part of these regulatory requirements include analyzing groundwater and unsaturated zone monitoring data using statistical procedures as described under 40 CFR 264.97. These regulations allow Amerada Hess to develop an alternative statistical approach in place of the suggested Students' t test, a test which is prone to false positive results. An alternative statistical approach has been developed under the guidance of a statistican, Dr. Robert Gibbons of the University of Illinois at Chicago.

The approach developed with Dr. Gibbons is a two-tiered approach which first tests the data against a modified Students' t test for significance as specified in the regulation. Secondly, if significance is indicated then a second test, the non-parametric test -- the Mann Whitney U test -- is used to check if this significance is the result of the type of test -- the Students' t test which is a parametric or bell-shaped curve test -- instead of actual constituents originating from the landfarm. In many cases the variance is the result of the limits of the chemical analytic results and background variances especially for measurements at and below sensitive concentrations (levels of detection).

Examples of statistical calculations using this two-tiered approach are included in this report for the HOVIC Refinery groundwater monitoring data from the landfarm system. All indicator parameters were not significantly different when tested under the two-tiered statistical approach presented herein. It is noted that the groundwaters beneath the HOVIC Refinery are saline so that normal temporal and spatial differences in groundwater quality have given false positive readings using the specified Students' t test from the RCRA regulations.

Recommended constituents for monitoring and constituent concentration levels adequate for statistical analyses are presented in this report in Table 2. The constituents to be included in the statistical analyses include the Principal Hazardous Constituents previously identified in Addendum B and several indicator parameters which are specifically characteristic of the oily sludges applied to the landfarms. It is recommended that three indicator parameters -- pH, conductivity, and Total Organic Halogen (TOX) -- be dropped from future statistical analyses. The two-tiered statistical approach can be used for groundwater monitoring data, unsaturated zone liquids (lysimeter samples), and unsaturated zone soil cores for the landfarm system.

The approach presented utilizes data from two background groundwater monitoring wells for each landfarm which are already present at the Port Reading Landfarm system.

The two-tiered statistical approach presented in this report meets the regulatory requirement and augments the use of the Students' t test. These methods will limit false positives that were prevalent with the original Students' t test.

SECTION 1

INTRODUCTION

SECTION 1
INTRODUCTION

Amerada Hess (Port Reading) Corporation, operates a landfarm system at a petroleum refinery located near Port Reading, New Jersey. The refinery currently operates the landfarm system under interim status authorization. As part of the RCRA permitting process, Port Reading has submitted a Resource Conservation and Recovery Act (RCRA) Part B Permit application for future operation of these landfarms. Under the RCRA 40 CFR 264 regulations which apply to the Part B Permit -- Paragraph 264.97, a statistical analysis program must be used to determine if statistical differences occur between the water quality parameters being monitored in the upgradient or background wells and in the downgradient wells (from the land treatment unit). If statistical differences are indicated at the 0.05 level, then the regulations assume that there has been constituent movement from the unit. As part of this application, Port Reading has prepared a statistical approach presented herein to be used for analyzing groundwater quality data and unsaturated zone soil and liquid samples under the RCRA Part B Permit.

BACKGROUND

Port Reading began to collect groundwater data in December 1985 from a set of nine new monitoring wells (three upgradient wells and six downgradient wells) at the Landfarm system.

Specifically, Port Reading has analyzed the groundwater samples for the indicator parameters -- pH, specific conductance at 25 ^{o}C (conductivity), total organic carbon (TOC), and total organic halogen (TOX) -- and two constituents responsible for the waste sludges to be listed under 40 CFR 261 as RCRA wastes, lead and chromium. The data for the indicator parameters have been subjected to the Students' t test as described under 40 CFR 265.93 and Appendix IV of 40 CFR 265. Under the 40 CFR 265 regulations, a statistically significant difference is assumed at the 0.01 level.

The Students' t test results on the HOVIC groundwater data have indicated some statistically significant differences when comparing upgradient and downgradient monitoring wells at the landfarms. These differences are believed to be false positives caused for the most part by naturally occurring spatial and temporal differences across the site, primarily due to varying salinity of the groundwater. It is noted that the Port Reading site groundwaters are brackish. For this reason, the HOVIC data are used as examples of similar groundwater variability. Lead and chromium concentrations in the groundwater samples for Port Reading have been less than the method detection levels.

Amerada Hess has discussed with NJDEP and EPA the problems with the Students' t test and various alternatives to this statistical test which might eliminate the many false positives associated with this method. Amerada Hess Corporation is suggesting alternative statistical procedures for the RCRA Part B Permit which might eliminate the false positives while still effectively giving true indications of constituent movement from the landfarms to the underlying groundwater. In these efforts, Amerada Hess Corporation consulted with Dr. Robert Gibbons, Professor of Statistics at the University of Illinois in Chicago, for the development of a technical approach to statistical analyses of the Amerada Hess Corporation groundwater data. The procedures developed and example calculations using the HOVIC data are presented in the following section.

SECTION 2

STATISTICAL PROTOCOLS FOR ANALYSIS OF THE PORT READING GROUNDWATER DATA

SECTION 2

STATISTICAL PROTOCOLS FOR ANALYSIS OF THE PORT READING GROUNDWATER DATA

Port Reading has been using the Students' t test as presented in 40 CFR 265, Appendix IV. The Students' t test is a statistical test for determining if data in one group of test samples, such as the downgradient wells, are related to the control group, in this case the upgradient wells. In this test, some confidence interval must be used and this has been established by regulation at the 0.01 level for the interim status groundwater monitoring and at the 0.05 level for future Part B Permit groundwater monitoring. A significant assumption of the Students' t test is that the data follow a statistically normal distribution (bell-shaped curve).

RECOMMENDED STATISTICAL APPROACH

The Port Reading data, as well as other sites' groundwater monitoring data, would not necessarily be expected to follow a normal distribution. At the advice of Dr. Gibbons, a three-tiered statistical approach was developed as outlined below.

Statistical Analyses of the Indicator Constituents and the Principal Hazardous Constituents

For the indicator parameters and the principal hazardous constituents such as lead, benzene, and phenol expected to be near or below the method detection limits, or are at the refinery background concentrations, the following criteria are to be used.

Threshold concentrations as presented in Table 1 have been set which are reflective of method detection limits or known refinery background conditions. That is, if the data are greater than three times the background or method detection limits (statistically not expected as demonstrated in Figure 1), then the data are subjected to further statistical testing. If the constituent concentration in a sample from the media being monitored -- groundwater, unsaturated zone liquids, or unsaturated zone soil cores -- is statistically higher than these established threshold concentrations, then the data are assumed candidates for potential statistical differences. The data will then be subjected to statistical analyses described in Steps 1 and 2 which follow. If the data are below these threshold limits, then the data are assumed to be not statistically different from background conditions. As an example, a threshold concentration for benzene of 50 micrograms per liter (ug/l or ppb in any groundwater sample or lysimeter sample is set as the limit at which statistical analyses will be implemented. That is, if benzene is detected at 50 ppb in a well (either upgradient or downgradient), then that parameter (benzene) is subjected to the statistical analysis. Since the Mann-Whitney U test ranks data (that is, puts the data in ascending order), results which are less-than detection limits, can be factored into the statistical test without having to define what the less-than number actually is.

The method limits of detection for soil samples will be dependent on the specific analytical test selected. A set point for statistical analyses for the soil samples has been established based on the specific method limits of detection achievable. The results of the Mann- Whitney U test would be used to determine if there has been a significant increase in the particular parameter tested; that is, a significant increase from upgradient to downgradient. The following steps will be taken in analyzing the Port Reading groundwater data.

Step 1. Analyze the data using the Students' t test. The approach is to obtain quarterly data from the background wells. At least 8 to 16 independent groundwater quality data from the background well(s) are compared with the most recently collected groundwater data for 3 sample periods for each downgradient well at each landfarm. The four replicate measurements of one groundwater sample (for a specific parameter such as conductivity) obtained during any one sampling round are averaged to yield one data point. That is, for each sample period only one data point (an average of the four replicate measurements) is used per individual groundwater monitoring well sampled.

As an example, in order to obtain twelve independent background data points, either the last consecutive twelve sample rounds of data are used or the last six consecutive sample rounds of data from two background wells at a landfarm will be used. These twelve values are converted to natural logarithms and compared at the 0.05 confidence level using the Students' t test with the natural logarithm of the value for the downgradient well (natural logarithm of the average of the four replicate data results for three sample rounds). The natural logarithms are used so that all constituents are comparable (because pH is a logarithmic function). If there are significant differences, then the data are subjected to a non-parametric test (that is , Mann-Whitney U test as described in Attachment 1). A nonparametric distribution does not follow a normal distribution (bell-shaped curve). If results are inconsistent then one assumes that the difference is due to distributional misspecification (that is, these data are not distributed normally -- statistically in a classsical bell-shaped curve -- as is assumed by the Students' t test, but not by the Mann-Whitney U test). Concordance between the results of these two tests suggest that the empirical distribution of these data are not affecting the test results.

Step 2. Analyze the data using a nonparametric statistical test, the Mann-Whitney U test. If there is a statistically significant increase (or pH decrease) in a parameter for a groundwater monitoring well based on the Students' t test results, then the non-parametric statistical test, the Mann-Whitney U test, is to be run on the data. The (natural) log means of the eight most recent data results from the background groundwater monitoring well are compared with the means of the data results from three downgradient groundwater monitoring wells. The Mann-Whitney U test procedure to be used is described in Attachment 1. If a non-significant result is obtained from the Mann-Whitney U test, then this suggests that these data did not follow a normal distribution. Therefore, the use of the Students' t test is inappropriate for analyzing these data. If a positive finding or significant increase also results from the Mann-Whitney U test, then there has most likely been a significant increase in that parameter. Therefore, a positive finding using both the

Students' t test (a parametric test or test of normally distributed data) and the Mann-Whitney U test (a nonparametric test) is an indication that a significant increase in that parameter has occurred in the groundwater monitoring well based on comparisons with the upgradient well(s).

EXAMPLE CALCULATIONS

Data from HOVIC groundwater wells were subjected to the statistical approach given above. Examples of the modified Students' t test results and for the Mann-Whitney U test results for all four interim status indicator parameters are given in Table 2 and the calculations are presented in Attachment 1.

It is noted that statistical differences are sometimes indicated for pH. It has been well documented that in-situ measurements in a groundwater monitoring well of pH versus groundwater brought to the surface or to the laboratory for measurements of pH are almost always different. For the most part, this phenomenon is caused by dissolved carbon dioxide, which is in the form of naturally occurring bicarbonates or carbonates in groundwater, escaping from the samples as they are exposed to the atmosphere. The typical result of this is that in-situ measurements for pH are for the most part lower (more acidic) than pH measurements on the same water sample once it is brought to the surface, that is, CO_2 is evolved depleting the natural weak carbonic acid solution in the groundwater. There is an equilibrium solution (groundwater) between CO2, carbonic acid, bicarbonates and carbonates -- all naturally present. The change in pH from in-the-well to the surface is due to the carbon dioxide loss from the water samples once they reach the surface. It is recommended that pH be dropped as a parameter for statistical analysis at Port Reading under the RCRA Part B Permit because of these naturally occurring chemical phonomena.

FUTURE MONITORING AND STATISTICAL ANALYSES

In order to achieve the necessary number of samples required for statistical analyses, quarterly groundwater samples will be collected from two background wells for each landfarm -- North Landfarm and No. 1 Landfarm. Both upgradient wells at each Landfarm will be sampled quarterly and a total of eight background samples can be obtained within a one-year period which would give the statistical tests the necessary power for determining significance at the 0.05 level.

The parameters to be subjected to the statistical analyses are given in Table 1.

A concentration of three times above background or above the method detection limit for constituents given in Table 1 will be used as a concentration of significance. That is, this concentration is outside the expected standard deviation (99 percent of values would fall within 2.58 times the reported value) for the reported value and thus represents a number statistically different than that reported for the background wells. The data thus warrant further statistical analyses. If the data are lower than the numbers reported in Table 1, then the downgradient wells data are assumed to be not statistically different than the upgradient wells data. Groundwater monitoring is recommended to be done on a quarterly basis.

TABLE 1. Statistical Level of Significance for the Master List of Principal Hazardous Constituents and Indicator Parameters

CONSTITUENT MONITORED	CONCENTRATION FOR STATISTICAL ANALYSES		
	UNSATURATED ZONE		GROUNDWATER
	SOIL CORES	LYSIMETERS	MONITORING WELLS
	SOIL SAMPLES (3 - 4 ft) (mg/Kg)	LIQUIDS (mg/l)	WATER (mg/l)
PRINCIPAL HAZARDOUS CONSTITUENTS			
METALS			
cadmium	70		
chromium	70		
lead	70		
VOLATILE COMPOUNDS			
benzene		0.050	0.050
) COMPOUNDS			
phenol		0.050	0.050
BASE/NEUTRAL COMPOUNDS			
naphthalene	50		
INDICATOR PARAMETERS			
pH			
conductivity			
total nitrogen			
oil and grease	3900	10	10

PORT READING

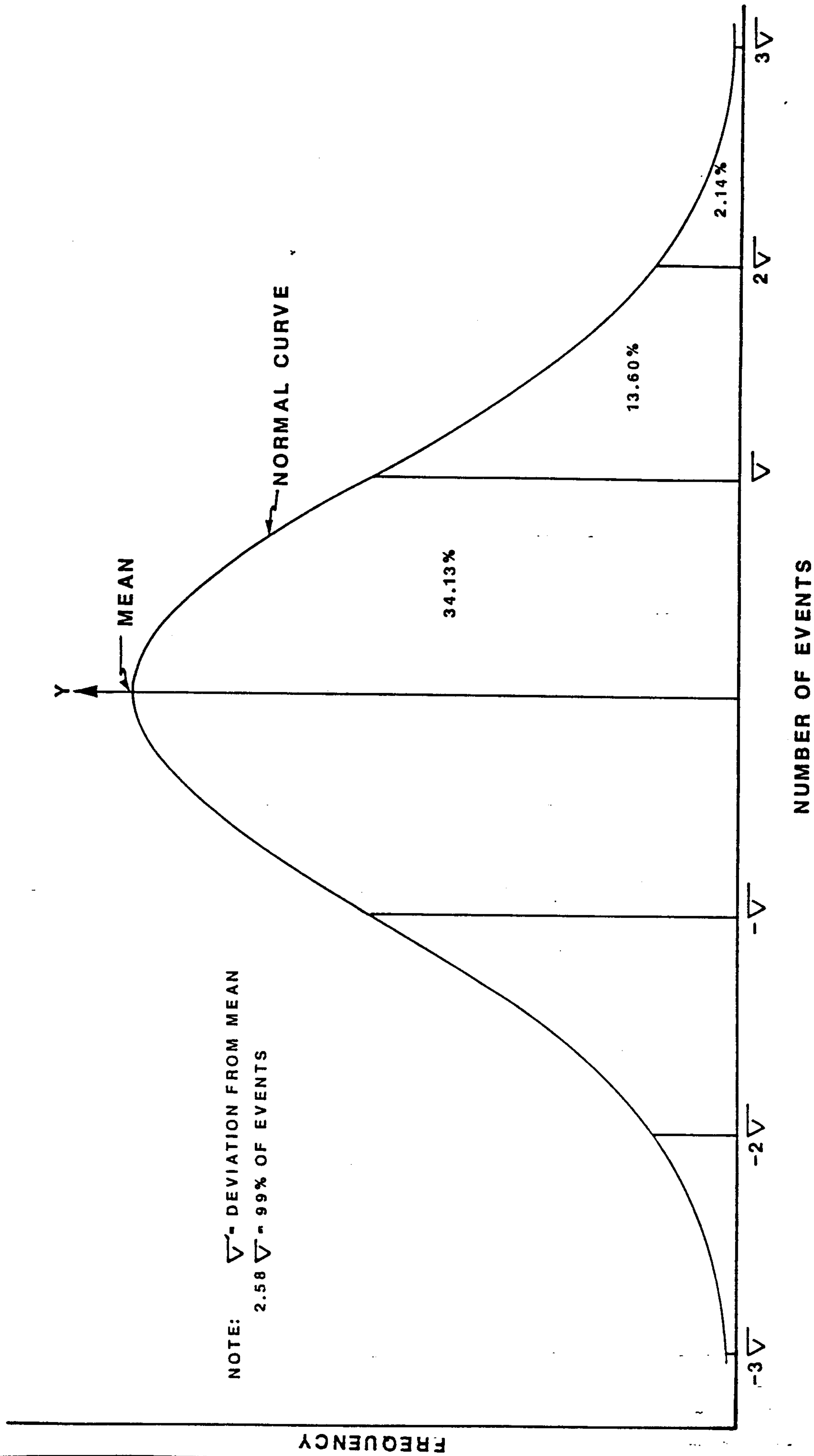

FIGURE 1

STANDARD DEVIATION AROUND A MEAN FOR NORMALLY DISTRIBUTED DATA

ATTACHMENT 1

MANN-WHITNEY U TEST PROCEDURES

(From Siegel. 1956.
Nonparametric Statistics for the Behavioral Sciences
McGraw-Hill, NY.)

PORT READING

References

Discussions of the median test are contained in Brown and Mood (1951), Mood (1950, pp. 394-395), and Moses (1952a).

THE MANN-WHITNEY U TEST

Function

When at least ordinal measurement has been achieved, the Mann-Whitney U test may be used to test whether two independent groups have been drawn from the same population. This is one of the most powerful of the nonparametric tests, and it is a most useful alternative to the parametric t test when the researcher wishes to avoid the t test's assumptions, or when the measurement in the research is weaker than interval scaling.

Suppose we have samples from two populations, population A and population B. The null hypothesis is that A and B have the same distribution. The alternative hypothesis, H_1, against which we test H_0, is that A is stochastically larger than B, a directional hypothesis. We may accept H_1 if the probability that a score from A is larger than a score from B is greater than one-half. That is, if a is one observation from population A, and b is one observation from population B, then H_1 is that $p(a > b) > \frac{1}{2}$. If the evidence supports H_1, this implies that the "bulk" of population A is higher than the bulk of population B.

Of course, we might predict instead that B is stochastically larger than A. Then H_1 would be that $p(a > b) < \frac{1}{2}$. Confirmation of this assertion would imply that the bulk of B is higher than the bulk of A.

For a two-tailed test, i.e., for a prediction of differences which does not state direction, H_1 would be that $p(a > b) \neq \frac{1}{2}$.

Method

Let n_1 = the number of cases in the smaller of two independent groups, and n_2 = the number of cases in the larger. To apply the U test, we first combine the observations or scores from both groups, and rank these in order of increasing size. In this ranking, algebraic size is considered, i.e., the lowest ranks are assigned to the largest negative numbers, if any.

Now focus on one of the groups, say the group with n_1 cases. The value of U (the statistic used in this test) is given by the number of times that a score in the group with n_2 cases precedes a score in the group with n_1 cases in the ranking.

For example, suppose we had an experimental group of 3 cases and a

the scores:

n_1	E scores	9	11	15	
n_2	C scores	6	8	10	13

3 downgradient
8 upgradient

To find U, we first rank these scores in order of increasing size, being careful to retain each score's identity as either an E or C score:

6	8	9	10	11	13	15
C	C	E	C	E	C	E

Now consider the control group, and count the number of E scores that precede each score in the control group. For the C score of 6, no E score precedes. This is also true for the C score of 8. For the next C score (10), one E score precedes. And for the final C score (13), two E scores precede. Thus $U = 0 + 0 + 1 + 2 = 3$. The number of times that an E score precedes a C score is $3 = U$.

The sampling distribution of U under H_0 is known, and with this knowledge we can determine the probability associated with the occurrence under H_0 of any U as extreme as an observed value of U.

* **Very small samples.** When neither n_1 nor n_2 is larger than 8, Table J of the Appendix may be used to determine the exact probability associated with the occurrence under H_0 of any U as extreme as an observed value of U. The reader will observe that Table J is made up of six separate subtables, one for each value of n_2, from $n_2 = 3$ to $n_2 = 8$. To determine the probability under H_0 associated with his data, the researcher need know only n_1 (the size of the smaller group), n_2, and U. With this information he may read the value of p from the subtable appropriate to his value of n_2.

In our example, $n_1 = 3$, $n_2 = 4$, and $U = 3$. The subtable for $n_2 = 4$ in Table J shows that $U \leq 3$ has probability of occurrence under H_0 of $p = .200$.

The probabilities given in Table J are one-tailed. For a two-tailed test, the value of p given in the table should be doubled.

Now it may happen that the observed value of U is so large that it does not appear in the subtable for the observed value of n_2. Such a value arises when the researcher focuses on the "wrong" group in determining U. We shall call such a too-large value U'. For example, suppose that in the above case we had counted the number of C scores preceding each E score rather than counting the number of E scores preceding each C score. We would have found that $U = 2 + 3 + 4 = 9$. The subtable for $n_2 = 4$ does not go up to $U = 9$. We therefore denote our observed value as $U' = 9$. We can transform any U' to U by

$$U = n_1 n_2 - U' \tag{6.6}$$

In our example, by this transformation $U = (3)(4) - 9 = 3$. Of course this is the U we found directly when we counted the number of E scores preceding each C score.

Example for Very Small Samples

Solomon and Coles[1] studied whether rats would generalize learned imitation when placed under a new drive and in a new situation. Five rats were trained to imitate leader rats in a T maze. They were trained to follow the leaders when hungry, in order to attain a food incentive. Then the 5 rats were each transferred to a shock-avoidance situation, where imitation of leader rats would have enabled them to avoid electric shock. Their behavior in the shock-avoidance situation was compared to that of 4 controls who had had no previous training to follow leaders. The hypothesis was that the 5 rats who had already been trained to imitate would transfer this training to the new situation, and thus would reach the learning criterion in the shock-avoidance situation sooner than would the 4 control rats. The comparison is in terms of how many trials each rat took to reach a criterion of 10 correct responses in 10 trials.

i. *Null Hypothesis.* H_0: the number of trials to the criterion in the shock-avoidance situation is the same for rats previously trained to follow a leader to a food incentive as for rats not previously trained. H_1: rats previously trained to follow a leader to a food incentive will reach the criterion in the shock-avoidance situation in fewer trials than will rats not previously trained.

ii. *Statistical Test.* The Mann-Whitney U test is chosen because this study employs two independent samples, uses small samples, and uses measurement (number of trials to criterion as an index to speed of learning) which is probably at most in an ordinal scale.

iii. *Significance Level.* Let $\alpha = .05$. $n_1 = 4$ control rats, and $n_2 = 5$ experimental rats.

iv. *Sampling Distribution.* The probabilities associated with the occurrence under H_0 of values as small as an observed U for n_1, $n_2 \leq 8$ are given in Table J.

v. *Rejection Region.* Since H_1 states the direction of the predicted difference, the region of rejection is one-tailed. It consists of all values of U which are so small that the probability associated with their occurrence under H_0 is equal to or less than $\alpha = .05$.

vi. *Decision.* The number of trials to criterion required by the E

[1] Solomon, R. L., and Coles, M. R. 1951. A case of failure of generalization of

and C rats were:

E rats	78	61	75	45	82
C rats	110	70	53	51	

We arrange these scores in the order of their size, retaining the identity of each:

45	51	53	61	70	75	78	82	110
E	*C*	*C*	*E*	*C*	*E*	*E*	*E*	*C*

We obtain U by counting the number of E scores preceding each C score: $U = 1 + 1 + 2 + 5 = 9$.

In Table J, we locate the subtable for $n_2 = 5$. We see that $U \leq 9$ when $n_1 = 4$ has a probability of occurrence under H_0 of $p = .452$. Our decision is that the data do not give evidence which justify rejecting H_0 at the previously set level of significance. The conclusion is that these data do not support the hypothesis that previous training to imitate will generalize across situations and across drives.[1]

n_2 between 9 and 20. If n_2 (the size of the larger of the two independent samples) is larger than 8, Table J may not be used. When n_2 is between 9 and 20, significance tests may be made with the Mann-Whitney test by using Table K of the Appendix which gives critical values of U for significance levels .001, .01, .025, and .05 for a one-tailed test. For a two-tailed test, the significance levels given are .002, .02, .05, and .10.

Notice that this set of tables gives critical values of U, and does not give exact probabilities (as does Table J). That is, if an observed U for a particular $n_1 \leq 20$ and n_2 between 9 and 20 is equal to or less than that value given in the table, H_0 may be rejected at the level of significance indicated at the head of that table.

For example, if $n_1 = 6$ and $n_2 = 13$, a U of 12 enables us to reject H_0 at $\alpha = .01$ for a one-tailed test, and to reject H_0 at $\alpha = .02$ for a two-tailed test.

Computing the value of U. For fairly large values of n_1 and n_2, the counting method of determining the value of U may be rather tedious. An alternative method, which gives identical results, is to assign the rank of 1 to the lowest score in the combined $(n_1 + n_2)$ group of scores, assign rank 2 to the next lowest score, etc. Then

$$U = n_1 n_2 + \frac{n_1(n_1 + 1)}{2} - R_1 \tag{6.7a}$$

or, equivalently,

$$U = n_1 n_2 + \frac{n_2(n_2 + 1)}{2} - R_2 \tag{6.7b}$$

where R_1 = sum of the ranks assigned to group whose sample size is n_1
R_2 = sum of the ranks assigned to group whose sample size is n_2

For example, we might have used this method in finding the value of U for the data given in the example for small samples above. The E and C scores for that example are given again in Table 6.13, with their ranks.

TABLE 6.13. TRIALS TO CRITERION OF E AND C RATS

E Score	Rank	C Score	Rank
78	7	110	9
64	4	70	5
75	6	53	3
45	1	51	2
82	8		
	$R_2 = 26$		$R_1 = 19$

For these data, $R_1 = 19$ and $R_2 = 26$, and it will be remembered that $n_1 = 4$ and $n_2 = 5$. By applying formula (6.7b), we have

$$U = (4)(5) + \frac{5(5 + 1)}{2} - 26$$
$$= 9$$

$U = 9$ is of course exactly the value we found earlier by counting.

Formulas (6.7a) and (6.7b) yield different U's. It is the smaller of these that we want. The larger value is U'. The investigator should check whether he has found U' rather than U by applying the transformation

$$U = n_1 n_2 - U' \tag{6.6}$$

The smaller of the two values, U, is the one whose sampling distribution is the basis for Table K. Although this value can be found by computing both formulas (6.7a) and (6.7b) and choosing the smaller of the two results, a simpler method is to use only one of those formulas and then find the other value by formula (6.6).

Large samples (n_2 larger than 20). Neither Table J nor Table K is usable when $n_2 > 20$. However, it has been shown (Mann and Whitney, 1947) that as n_1, n_2 increase in size, the sampling distribution of U rapidly approaches the normal distribution, with

$$\text{Mean} = \mu_U = \frac{n_1 n_2}{2}$$

and

$$\text{Standard deviation} = \sigma_U = \sqrt{\frac{(n_1)(n_2)(n_1 + n_2 + 1)}{12}}$$

That is, when $n_2 > 20$ we may determine the significance of an observed value of U by

$$z = \frac{U - \mu_U}{\sigma_U} = \frac{U - \frac{n_1 n_2}{2}}{\sqrt{\frac{(n_1)(n_2)(n_1 + n_2 + 1)}{12}}} \tag{6.8}$$

which is practically normally distributed with zero mean and unit variance. That is, the probability associated with the occurrence under H_0 of values as extreme as an observed z may be determined by reference to Table A of the Appendix.

When the normal approximation to the sampling distribution of U is used in a test of H_0, it does not matter whether formula (6.7a) or (6.7b) is used in the computation of U, for the absolute value of z yielded by formula (6.8) will be the same if either is used. The sign of the z depends on whether U or U' was used, but the value does not.

Example for Large Samples

For our example, we will reexamine the Whiting and Child data which we have already analyzed by the median test (on pages 112 to 115).

i. *Null Hypothesis.* H_0: oral socialization anxiety is equally severe in both societies with oral explanations of illness present and societies with oral explanations absent. H_1: societies with oral explanations of illness present are (stochastically) higher in oral socialization anxiety than societies which do not have oral explanations of illness.

ii. *Statistical Test.* The two groups of societies constitute two independent groups, and the measure of oral socialization anxiety (rating scale) constitutes an ordinal measure at best. For these reasons the Mann-Whitney U test is appropriate for analyzing these data.

iii. *Significance Level.* Let $\alpha = .01$. $n_1 = 16$ = the number of societies with oral explanations absent; $n_2 = 23$ = the number of societies with oral explanations present.

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iv. *Sampling Distribution.* For $n_2 > 20$, formula (6.8) yields values of z. The probability associated with the occurrence under H_0 of values as extreme as an observed z may be determined by reference to Table A.

v. *Rejection Region.* Since H_1 predicts the direction of the difference, the region of rejection is one-tailed. It consists of all values of z (from data in which the difference is in the predicted direction) which are so extreme that their associated probability under H_0 is equal to or less than $\alpha = .01$.

vi. *Decision.* The ratings assigned to each of the 30 societies are shown in Table 6.14, together with the rank of each in the combined

TABLE 6.14. ORAL SOCIALIZATION ANXIETY AND ORAL EXPLANATIONS OF ILLNESS

Societies with oral explanations absent	Rating on oral socialization anxiety	Rank	Societies with oral explanations present	Rating on oral socialization anxiety	Rank
Lapp	13	29.5	Marquesans	17	39
Chamorro	12	21.5	Dobuans	16	38
Samoans	12	21.5	Baiga	15	36
Arapesh	10	16	Kwoma	15	36
Balinese	10	16	Thonga	15	36
Hopi	10	16	Alorese	14	33
Tanala	10	16	Chagga	14	33
Paiute	9	12	Navaho	14	33
Chenchu	8	9.5	Dahomeans	13	29.5
Teton	8	9.5	Lesu	13	29.5
Flathead	7	5	Masai	13	29.5
Papago	7	5	Lepcha	12	24.5
Venda	7	5	Maori	12	24.5
Warrau	7	5	Pukapukans	12	24.5
Wogeo	7	5	Trobrianders	12	24.5
Ontong-Javanese	6	1.5	Kwakiutl	11	20.5
			Manus	11	20.5
			Chiricahua	10	16
		$R_1 = 200.0$	Comanche	10	16
			Siriono	10	16
			Bena	8	9.5
			Slavo	8	9.5
			Kurtatchi	6	1.5
					$R_2 = 580.0$

group. Notice that tied ratings are assigned the average of the tied ranks. For these data, $R_1 = 200.0$ and $R_2 = 580.0$. The value of U may be found by substituting the observed values in formula (6.7a):

$$U = n_1n_2 + \frac{n_1(n_1+1)}{2} - R_1 \tag{6.7a}$$

$$= (16)(23) + \frac{16(16+1)}{2} - 200$$

$$= 304$$

Knowing that $U = 304$, we may find the value of z by substituting in formula (6.8):

$$z = \frac{U - \frac{n_1n_2}{2}}{\sqrt{\frac{(n_1)(n_2)(n_1+n_2+1)}{12}}} \tag{6.8}$$

$$= \frac{304 - \frac{(16)(23)}{2}}{\sqrt{\frac{(16)(23)(16+23+1)}{12}}}$$

$$= 3.43$$

Reference to Table A reveals that $z \geq 3.43$ has a one-tailed probability under H_0 of $p < .0003$. Since this p is smaller than $\alpha = .01$, our decision is to reject H_0 in favor of H_1.* We conclude that societies with oral explanations of illness present are (stochastically) higher in oral socialization anxiety than societies with oral explanations absent.

It is important to notice that for these data the Mann-Whitney U test exhibits greater power to reject H_0 than the median test. Testing a similar hypothesis about these data, the median test yielded a value which permitted rejection of H_0 at the $p < .005$ level (one-tailed test), whereas the Mann-Whitney test yielded a value which permitted rejection of H_0 at the $p < .0003$ level (one-tailed test). The fact that the Mann-Whitney test is more powerful than the median test is not surprising, inasmuch as it considers the rank value of each observation rather than simply its location with respect to the combined median, and thus uses more of the information in the data.

Ties. The Mann-Whitney test assumes that the scores represent a distribution which has underlying continuity. With very precise measurement of a variable which has underlying continuity, the probability of a tie is zero. However, with the relatively crude measures which we typically employ in behavioral scientific research, ties may well occur.

* As we have already noted, Whiting and Child reached the same decision on the basis of the parametric t test. They found that $t = 4.05$, $p < .0005$.

We assume that the two observations which obtain tied scores are really different, but that this difference is simply too refined or minute for detection by our crude measures.

When tied scores occur, we give each of the tied observations the average of the ranks they would have had if no ties had occurred.

If the ties occur between two or more observations in the same group, the value of U is not affected. But if ties occur between two or more observations involving both groups, the value of U is affected. Although the effect is usually negligible, a correction for ties is available for use with the normal curve approximation which we employ for large samples.

The effect of tied ranks is to change the variability of the set of ranks. Thus the correction for ties must be applied to the standard deviation of the sampling distribution of U. Corrected for ties, the standard deviation becomes

$$\sigma_U = \sqrt{\left(\frac{n_1 n_2}{N(N-1)}\right)\left(\frac{N^3 - N}{12} - \Sigma T\right)}$$

where $N = n_1 + n_2$

$T = \frac{t^3 - t}{12}$ (where t is the number of observations tied for a given rank)

ΣT is found by summing the T's over all groups of tied observations

With the correction for ties, we find z by

$$z = \frac{U - \frac{n_1 n_2}{2}}{\sqrt{\left(\frac{n_1 n_2}{N(N-1)}\right)\left(\frac{N^3 - N}{12} - \Sigma T\right)}} \qquad (6.9)$$

It may be seen that if there are no ties, the above expression reduces directly to that given originally for z [formula (6.8)].

The use of the correction for ties may be illustrated by applying that correction to the data in Table 6.14. For those data,

$$n_1 + n_2 = 16 + 23 = 39 = N$$

We observe these tied groups:

2 scores of 6
5 scores of 7
4 scores of 8
7 scores of 10
2 scores of 11
6 scores of 12
4 scores of 13
3 scores of 14
3 scores of 15

Thus we have t's of 2, 5, 4, 7, 2, 6, 4, 3, and 3. To find ΣT, we sum the values of $\frac{t^3 - t}{12}$ for each of these tied groups:

$$\Sigma T = \frac{2^3-2}{12} + \frac{5^3-5}{12} + \frac{4^3-4}{12} + \frac{7^3-7}{12} + \frac{2^3-2}{12} + \frac{6^3-6}{12} + \frac{4^3-4}{12} + \frac{3^3-3}{12} + \frac{3^3-3}{12}$$
$$= .5 + 10.0 + 5.0 + 28.0 + .5 + 17.5 + 5.0 + 2.0 + 2.0$$
$$= 70.5$$

Thus for the data in Table 6.14, $n_1 = 16$, $n_2 = 23$, $N = 39$, $U = 301$, and $\Sigma T = 70.5$. Substituting these values in formula (6.9), we have

$$z = \frac{U - \frac{n_1 n_2}{2}}{\sqrt{\left(\frac{n_1 n_2}{N(N-1)}\right)\left(\frac{N^3 - N}{12} - \Sigma T\right)}} \qquad (6.9)$$

$$= \frac{301 - \frac{(16)(23)}{2}}{\sqrt{\left(\frac{(16)(23)}{39(39-1)}\right)\left(\frac{(39)^3 - 39}{12} - 70.5\right)}}$$

$$= 3.45$$

The value of z when corrected for ties is a little larger than that found earlier when the correction was not incorporated. The difference between $z \geq 3.43$ and $z \geq 3.45$, however, is negligible in so far as the probability given by Table A is concerned. Both z's are read as having an associated probability of $p < .0003$ (one-tailed test).

As this example demonstrates, ties have only a slight effect. Even when a large proportion of the scores are tied (this example had over 90 per cent of its observations involved in ties) the effect is practically negligible. Observe, however, that the magnitude of the correction factor, ΣT, depends importantly on the *length* of the various ties, i.e., on the size of the various t's. Thus a tie of length 4 contributes 5.0 to ΣT in this example, whereas two ties of length 2 contribute together only 1.0 (that is, .5 + .5) to ΣT. And a tie of length 6 contributes 17.5, whereas two of length 3 contribute together only 2.0 + 2.0 = 4.0.

When the correction is employed, it tends to *increase* the value of z slightly, making it more significant. Therefore when we do not correct for ties our test is "conservative" in that the value of p will be slightly inflated. That is, the value of the probability associated with the observed data under H_0 will be slightly larger than that which would be found were the correction employed. The writer's recommendation is that one should correct for ties only if the proportion of ties is quite large, if some of the t's are large, or if the p which is obtained without the correction is very close to one's previously set value of α.

Summary of procedure. These are the steps in the use of the Mann-Whitney U test:

1. Determine the values of n_1 and n_2. n_1 = the number of cases in the smaller group; n_2 = the number of cases in the larger group.
2. Rank together the scores for both groups, assigning the rank of 1 to the score which is algebraically lowest. Ranks range from 1 to $N = n_1 + n_2$. Assign tied observations the average of the tied ranks.
3. Determine the value of U either by the counting method or by applying formula (6.7a) or (6.7b).
4. The method for determining the significance of the observed value of U depends on the size of n_2:
   a. If n_2 is 8 or less, the exact probability associated with a value as small as the observed value of U is shown in Table J. For a two-tailed test, double the value of p shown in that table. If your observed U is not shown in Table J, it is U' and should be transformed to U by formula (6.6).
   b. If n_2 is between 9 and 20, the significance of any observed value of U may be determined by reference to Table K. If your observed value of U is larger than $n_1n_2/2$, it is U'; apply formula (6.6) for a transformation.
   c. If n_2 is larger than 20, the probability associated with a value as extreme as the observed value of U may be determined by computing the value of z as given by formula (6.8), and testing this value by referring to Table A. For a two-tailed test, double the p shown in that table. If the proportion of ties is very large or if the obtained p is very close to α, apply the correction for ties, i.e., use formula (6.9) rather than (6.8).
5. If the observed value of U has an associated probability equal to or less than α, reject H_0 in favor of H_1.

Power-Efficiency

If the Mann-Whitney test is applied to data which might properly be analyzed by the most powerful parametric test, the t test, its power-efficiency approaches $3/\pi = 95.5$ per cent as N increases (Mood, 1954), and is close to 95 per cent even for moderate-sized samples. It is therefore an excellent alternative to the t test, and of course it does not have the restrictive assumptions and requirements associated with the t test.

Whitney (1948, pp. 51–56) gives examples of distributions for which the U test is superior to its parametric alternative, i.e., for which the U test has *greater* power to reject H_0.

References

For discussions of the Mann-Whitney test,[1] the reader may refer to Auble (1953), Mann and Whitney (1947), Whitney (1948), and Wilcoxon (1945).

THE KOLMOGOROV-SMIRNOV TWO-SAMPLE TEST

Function and Rationale

The Kolmogorov-Smirnov two-sample test is a test of whether two independent samples have been drawn from the same population (or from populations with the same distribution). The two-tailed test is sensitive to any kind of difference in the distributions from which the two samples were drawn—differences in location (central tendency), in dispersion, in skewness, etc. The one-tailed test is used to decide whether or not the values of the population from which one of the samples was drawn are stochastically larger than the values of the population from which the other sample was drawn, e.g., to test the prediction that the scores of an experimental group will be "better" than those of the control group.

Like the Kolmogorov-Smirnov one-sample test (pages 47 to 52), this two-sample test is concerned with the agreement between two cumulative distributions. The one-sample test is concerned with the agreement between the distribution of a set of sample values and some specified theoretical distribution. The two-sample test is concerned with the agreement between two sets of sample values.

If the two samples have in fact been drawn from the same population distribution, then the cumulative distributions of both samples may be expected to be fairly close to each other, inasmuch as they both should show only random deviations from the population distribution. If the

[1] Two nonparametric statistical tests which are essentially equivalent to the Mann-Whitney U test have been reported in the literature and should be mentioned here. The first of these is due to Festinger (1946). He gives a method for calculating exact probabilities and gives a two-tailed table for the .05 and .01 levels of significance for $n_1 + n_2 \leq 40$, when $n_1 \leq 12$. In addition, for n_1 from 13 to 15, values are given up to $n_1 + n_2 = 30$.

The second test is due to White (1952), who gives a method essentially the same as the Mann-Whitney test except that rather than U it employs R (the sum of the ranks of one of the groups) as its statistic. White offers two-tailed tables for the .05, .01, and .001 levels of significance for $n_1 + n_2 \leq 30$.

Inasmuch as these tests are linearly related to the Mann-Whitney test (and therefore will yield the same results in the test of H_0 for any given batch of data), it was felt that inclusion of complete discussions of them in this text would introduce unnecessary redundancy.

TABLE J. TABLE OF PROBABILITIES ASSOCIATED WITH VALUES AS SMALL AS OBSERVED VALUES OF U IN THE MANN-WHITNEY TEST*

$n_2 = 3$

U \ n_1	1	2	3
0	.250	.100	.050
1	.500	.200	.100
2	.750	.400	.200
3		.600	.350
4			.500
5			.650

$n_2 = 4$

U \ n_1	1	2	3	4
0	.200	.067	.028	.014
1	.400	.133	.057	.029
2	.600	.267	.114	.057
3		.400	.200	.100
4		.600	.314	.171
5			.429	.243
6			.571	.343
7				.443
8				.557

$n_2 = 5$

U \ n_1	1	2	3	4	5
0	.167	.047	.018	.008	.004
1	.333	.095	.036	.016	.008
2	.500	.190	.071	.032	.016
3	.667	.286	.125	.056	.028
4		.429	.196	.095	.048
5		.571	.286	.143	.075
6			.393	.206	.111
7			.500	.278	.155
8			.607	.365	.210
9				.452	.274
10				.548	.345
11					.421
12					.500
13					.579

$n_2 = 6$

U \ n_1	1	2	3	4	5	6
0	.143	.036	.012	.005	.002	.001
1	.286	.071	.024	.010	.004	.002
2	.428	.143	.048	.019	.009	.004
3	.571	.214	.083	.033	.015	.008
4		.321	.131	.057	.026	.013
5		.429	.190	.086	.041	.021
6		.571	.274	.129	.063	.032
7			.357	.176	.089	.047
8			.452	.238	.123	.066
9			.548	.305	.165	.090
10				.381	.214	.120
11				.457	.268	.155
12				.545	.331	.197
13					.396	.242
14					.465	.294
15					.535	.350
16						.409
17						.469
18						.531

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.05
.01
.315

TABLE J. TABLE OF PROBABILITIES ASSOCIATED WITH VALUES AS SMALL AS OBSERVED VALUES OF U IN THE MANN-WHITNEY TEST* (*Continued*)

$n_2 = 7$

U \ n_1	1	2	3	4	5	6	7
0	.125	.028	.008	.003	.001	.001	.000
1	.250	.056	.017	.006	.003	.001	.001
2	.375	.111	.033	.012	.005	.002	.001
3	.500	.167	.058	.021	.009	.004	.002
4	.625	.250	.092	.036	.015	.007	.003
5		.333	.133	.055	.024	.011	.006
6		.444	.192	.082	.037	.017	.009
7		.556	.258	.115	.053	.026	.013
8			.333	.158	.074	.037	.019
9			.417	.206	.101	.051	.027
10			.500	.264	.134	.069	.036
11			.583	.324	.172	.090	.049
12				.394	.216	.117	.064
13				.464	.265	.147	.082
14				.538	.319	.183	.104
15					.378	.223	.130
16					.438	.267	.159
17					.500	.314	.191
18					.562	.365	.228
19						.418	.267
20						.473	.310
21						.527	.355
22							.402
23							.451
24							.500
25							.549

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* 8 upgradient wells
3 downgradient wells

TABLE J. TABLE OF PROBABILITIES ASSOCIATED WITH VALUES AS SMALL AS OBSERVED VALUES OF U IN THE MANN-WHITNEY TEST* (*Continued*)

$n_2 = 8$

U \ n_1	1	2	3 (0.01)	4	5	6	7	8	t	Normal
0	.111	.022	.006	.002	.001	.000	.000	.000	3.308	.001
1	.222	.044	.012	.004	.002	.001	.000	.000	3.203	.001
2	.333	.089	.024	.008	.003	.001	.001	.000	3.098	.001
3	.444	.133	.042	.014	.005	.002	.001	.001	2.993	.001
4	.556	.200	.067	.024	.009	.004	.002	.001	2.888	.002
5		.267	.097	.036	.015	.006	.003	.001	2.783	.003
6		.356	.139	.055	.023	.010	.005	.002	2.678	.004
7		.444	.188	.077	.033	.015	.007	.003	2.573	.005
8		.556	.248	.107	.047	.021	.010	.005	2.468	.007
9			.315	.141	.064	.030	.014	.007	2.363	.009
10			.387	.184	.085	.041	.020	.010	2.258	.012
11			.461	.230	.111	.054	.027	.014	2.153	.016
12			.539	.285	.142	.071	.036	.019	2.048	.020
13				.341	.177	.091	.047	.025	1.943	.026
14				.404	.218	.114	.060	.032	1.838	.033
15				.467	.262	.141	.076	.041	1.733	.041
16				.533	.311	.172	.095	.052	1.628	.052
17					.362	.207	.116	.065	1.523	.064
18					.416	.245	.140	.080	1.418	.078
19					.472	.286	.168	.097	1.313	.094
20					.528	.331	.198	.117	1.208	.113
21						.377	.232	.139	1.102	.135
22						.426	.268	.164	.998	.159
23						.475	.306	.191	.893	.185
24						.525	.347	.221	.788	.215
25							.389	.253	.683	.247
26							.433	.287	.578	.282
27							.478	.323	.473	.318
28							.522	.360	.368	.356
29								.399	.263	.396
30								.439	.158	.437
31								.480	.052	.481
32								.520		

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Table K. Table of Critical Values of U in the Mann-Whitney Test*

Table K_I. Critical Values of U for a One-tailed Test at $\alpha = .001$ or for a Two-tailed Test at $\alpha = .002$

n_1 \ n_2	9	10	11	12	13	14	15	16	17	18	19	20
1												
2												
3									0	0	0	0
4		0	0	0	1	1	1	2	2	3	3	3
5	1	1	2	2	3	3	4	5	5	6	7	7
6	2	3	4	4	5	6	7	8	9	10	11	12
7	3	5	6	7	8	9	10	11	13	14	15	16
8	5	6	8	9	11	12	14	15	17	18	20	21
9	7	8	10	12	14	15	17	19	21	23	25	26
10	8	10	12	14	17	19	21	23	25	27	29	32
11	10	12	15	17	20	22	24	27	29	32	34	37
12	12	14	17	20	23	25	28	31	34	37	40	42
13	14	17	20	23	26	29	32	35	38	42	45	48
14	15	19	22	25	29	32	36	39	43	46	50	54
15	17	21	24	28	32	36	40	43	47	51	55	59
16	19	23	27	31	35	39	43	48	52	56	60	65
17	21	25	29	34	38	43	47	52	57	61	66	70
18	23	27	32	37	42	46	51	56	61	66	71	76
19	26	29	34	40	45	50	55	60	66	71	77	82
20	26	32	37	42	48	54	59	65	70	76	82	88

* Adapted and abridged from Tables 1, 3, 5, and 7 of Auble, D. 1953. Extended tables for the Mann-Whitney statistic. *Bulletin of the Institute of Educational Research at Indiana University*, 1, No. 2, with the kind permission of the author and the publisher.

Table K. Table of Critical Values of U in the Mann-Whitney Test* (*Continued*)

Table K_{II}. Critical Values of U for a One-tailed Test at $\alpha = .01$ or for a Two-tailed Test at $\alpha = .02$

n_1 \ n_2	9	10	11	12	13	14	15	16	17	18	19	20
1												
2					0	0	0	0	0	0	1	1
3	1	1	1	2	2	2	3	3	4	4	4	5
4	3	3	4	5	5	6	7	7	8	9	9	10
5	5	6	7	8	9	10	11	12	13	14	15	16
6	7	8	9	11	12	13	15	16	18	19	20	22
7	9	11	12	14	16	17	19	21	23	24	26	28
8	11	13	15	17	20	22	24	26	28	30	32	34
9	14	16	18	21	23	26	28	31	33	36	38	40
10	16	19	22	24	27	30	33	36	38	41	44	47
11	18	22	25	28	31	34	37	41	44	47	50	53
12	21	24	28	$\boxed{31}$	35	38	42	46	49	53	56	60
13	23	27	31	35	39	43	47	51	55	59	63	67
14	26	30	34	38	43	47	51	56	60	65	69	73
15	28	33	37	42	47	51	56	61	66	70	75	80
16	31	36	41	46	51	56	61	66	71	76	82	87
17	33	38	44	49	55	60	66	71	77	82	88	93
18	36	41	47	53	59	65	70	76	82	88	94	100
19	38	44	50	56	63	69	75	82	88	94	101	107
20	40	47	53	60	67	73	80	87	93	100	107	114

* Adapted and abridged from Tables 1, 3, 5, and 7 of Auble, D. 1953. Extended tables for the Mann-Whitney statistic. *Bulletin of the Institute of Educational Research at Indiana University*, 1, No. 2, with the kind permission of the author and the publisher.

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 * Ph only

TABLE K. TABLE OF CRITICAL VALUES OF U IN THE MANN-WHITNEY TEST* (*Continued*)

Table K$_{III}$. Critical Values of U for a One-tailed Test at $\alpha = .025$ or for a Two-tailed Test at $\alpha = .05$

n_2 \ n_1	9	10	11	12	13	14	15	16	17	18	19	20
1												
2	0	0	0	1	1	1	1	1	2	2	2	2
3	2	3	3	4	4	5	5	6	6	7	7	8
4	4	5	6	7	8	9	10	11	11	12	13	13
5	7	8	9	11	12	13	14	15	17	18	19	20
6	10	11	13	14	16	17	19	21	22	24	25	27
7	12	14	16	18	20	22	24	26	28	30	32	34
8	15	17	19	22	24	26	29	31	34	36	38	41
9	17	20	23	26	28	31	34	37	39	42	45	48
10	20	23	26	$\boxed{29}$	33	36	39	42	45	48	52	55
11	23	26	30	33	37	40	44	47	51	55	58	62
12	26	29	33	37	41	45	49	53	57	61	65	69
13	28	33	37	41	45	50	54	59	63	67	72	76
14	31	36	40	45	50	55	59	64	67	74	78	83
15	34	39	44	49	54	59	64	70	75	80	85	90
16	37	42	47	53	59	64	70	75	81	86	92	98
17	39	45	51	57	63	67	75	81	87	93	99	105
18	42	48	55	61	67	74	80	86	93	99	106	112
19	45	52	58	65	72	78	85	92	99	106	113	119
20	48	55	62	69	76	83	90	98	105	112	119	127

* Adapted and abridged from Tables 1, 3, 5, and 7 of Auble, D. 1953. Extended tables for the Mann-Whitney statistic. *Bulletin of the Institute of Educational Research at Indiana University*, 1, No. 2, with the kind permission of the author and the publisher.

 * Everything but p10

TABLE K. TABLE OF CRITICAL VALUES OF U IN THE MANN-WHITNEY TEST* (*Continued*)

Table K$_{IV}$. Critical Values of U for a One-tailed Test at $\alpha = .05$ or for a Two-tailed Test at $\alpha = .10$

n_2 \ n_1	9	10	11	12	13	14	15	16	17	18	19	20
1											0	0
2	1	1	1	2	2	2	3	3	3	4	4	4
3	3	4	5	5	6	7	7	8	9	9	10	11
4	6	7	8	9	10	11	12	14	15	16	17	18
5	9	11	12	13	15	16	18	19	20	22	23	25
6	12	14	16	17	19	21	23	25	26	28	30	32
7	15	17	19	21	24	26	28	30	33	35	37	39
8	18	20	23	26	28	31	33	36	39	41	44	47
9	21	24	27	30	33	36	39	42	45	48	51	54
10	24	27	31	$\boxed{34}$	37	41	44	48	51	55	58	62
11	27	31	34	38	42	46	50	54	57	61	65	69
12	30	34	38	42	47	51	55	60	64	68	72	77
13	33	37	42	47	51	56	61	65	70	75	80	84
14	36	41	46	51	56	61	66	71	77	82	87	92
15	39	44	50	55	61	66	72	77	83	88	94	100
16	42	48	54	60	65	71	77	83	89	95	101	107
17	45	51	57	64	70	77	83	89	96	102	109	115
18	48	55	61	68	75	82	88	95	102	109	116	123
19	51	58	65	72	80	87	94	101	109	116	123	130
20	54	62	69	77	84	92	100	107	115	123	130	138

* Adapted and abridged from Tables 1, 3, 5, and 7 of Auble, D. 1953. Extended tables for the Mann-Whitney statistic. *Bulletin of the Institute of Educational Research at Indiana University*, 1, No. 2, with the kind permission of the author and the publisher.

ATTCHMENT 2

STATISTICAL CALCULATIONS FROM HOVIC

LEGEND

MODIFIED STUDENTS' T TEST

$$t^* = \sqrt{\frac{S_{dg} - \overline{X}_{bg}}{\sqrt{\frac{S_{bg}^2}{n}}}}$$

Where:

X_{dg}	=	ln concentration (value)in downgradient well for most recent sampling period
$\overline{X}_{bg}$	=	ln mean of at least the last eight data points from one or more background wells
S_{bg}^2	=	variance
n	=	number of upgradient data points used $8 \leq n \leq 16$
tc	=	$\dfrac{t_{bg}\, S_{bg}{}^{z}/n}{S^2_{bg/n}} = t_{bg}$

(From Standard T-Tables 0.05 level of significance for n-1 degrees of freedom)

$t^* < t_{bg}$	There has not been a significant change in this parameter
$t^* > t_{bg}$	Most likely there has been a significant increase (or pH decrease) in this parameter

TABLE 1. MODIFIED STUDENTS' t TEST FOR pH AT LANDFARMS II AND III

LANDFARM	MONITORING WELL #	MONITORING WELL # LOCATION	SAMPLING DATE	pH (s.u.)	pH (s.u.)	$\overline{x}$-bg	s^2-bg	$\sqrt{s^2\text{-bg}/n}$	$\overline{x}$-dg	t*	tc	STANDING
II	NSF-1	upgradient	30-Nov-83	7.2850	7.2850							
	NSF-1	upgradient	06-Mar-84	7.2875	7.2875							
	NSF-1	upgradient	12-Apr-84	7.5750	7.5750							
	NSF-1	upgradient	03-Jun-84	7.4050	7.4050							
	NSF-1	upgradient	20-Aug-84	7.4525	7.4525							
	NSF-1	upgradient	28-Nov-84	7.5325	7.5325							
	NSF-1	upgradient	20-Mar-85	7.2025	7.2025							
	NSF-1	upgradient	01-Jul-85	7.5025	7.5025	7.4053	0.0180	0.0475				
	NSF-2	downgradient	01-Jul-85	7.0300	7.0300				7.0300	-7.9082	2.3650	B
	NSF-3	downgradient	01-Jul-85	7.3375	7.3375				7.3375	-1.4289	2.3650	A
	NSF-4	downgradient	01-Jul-85	7.3700	7.3700				7.3700	-0.7441	2.3650	A
III	SSF-1	upgradient	02-Jun-83	7.3750	7.3750							
	SSF-1	upgradient	27-Sep-83	7.1500	7.1500							
	SSF-1	upgradient	06-Mar-84	7.1250	7.1250							
	SSF-1	upgradient	03-Jun-84	7.3625	7.3625							
	SSF-1	upgradient	20-Aug-84	6.9775	6.9775							
	SSF-1	upgradient	28-Nov-84	7.4325	7.4325							
	SSF-1	upgradient	20-Mar-85	6.8725	6.8725							
	SSF-1	upgradient	01-Jul-85	7.0775	7.0775	7.1716	0.0406	0.0713				
	SSF-2	downgradient	01-Jul-85	7.2000	7.2000				7.2000	0.3990	2.3650	A
	SSF-3	downgradient	01-Jul-85	7.3375	7.3375				7.3375	2.3280	2.3650	A
	SSF-4	downgradient	01-Jul-85	7.1275	7.1275				7.1275	-0.6182	2.3650	A

NOTE: A - THERE HAS NOT BEEN A SIGNIFICANT CHANGE IN THIS PARAMETER

B - MOST LIKELY THERE HAS BEEN A SIGNIFICANT INCREASE (OR pH DECREASE) IN THIS PARAMETER

pH IS A LOG FUNCTION

TABLE 2. MANN-WHITNEY U TEST FOR pH AT LANDFARMS II AND III

LANDFARM	MONITORING WELL #	MONITORING WELL # LOCATION	SAMPLING DATE	pH (s.u.)	pH (s.u.)	U-1	U-2 (pH only)	P-1	P-2 (pH only)	STANDING	CONFIDENCE INTERVAL
II	NSF-2	downgradient	01-Jul-85	7.0300	7.0300						
	NSF-1	upgradient	20-Mar-85	7.2025	7.2025	1	2				
	NSF-1	upgradient	30-Nov-83	7.2850	7.2850	1	2				
	NSF-1	upgradient	06-Mar-84	7.2875	7.2875	1	2				
	NSF-3	downgradient	01-Jul-85	7.3375	7.3375						
	NSF-4	downgradient	01-Jul-85	7.3700	7.3700						
	NSF-1	upgradient	03-Jun-84	7.4050	7.4050	3	0				
	NSF-1	upgradient	20-Aug-84	7.4525	7.4525	3	0				
	NSF-1	upgradient	01-Jul-85	7.5025	7.5025	3	0				
	NSF-1	upgradient	28-Nov-84	7.5325	7.5325	3	0				
	NSF-1	upgradient	12-Apr-84	7.5750	7.5750	3	0				
						18		>.539		A	0.05
							6		0.278	A	0.05
III	SSF-1	upgradient	20-Mar-85	6.8725	6.8725	0	3				
	SSF-1	upgradient	20-Aug-84	6.9775	6.9775	0	3				
	SSF-1	upgradient	01-Jul-85	7.0775	7.0775	0	3				
	SSF-1	upgradient	06-Mar-84	7.1250	7.1250	0	3				
	SSF-4	downgradient	01-Jul-85	7.1275	7.1275						
	SSF-1	upgradient	27-Sep-83	7.1500	7.1500	1	2				
	SSF-2	downgradient	01-Jul-85	7.2000	7.2000						
	SSF-3	downgradient	01-Jul-85	7.3375	7.3375						
	SSF-1	upgradient	03-Jun-84	7.3625	7.3625	3	0				
	SSF-1	upgradient	02-Jun-83	7.3750	7.3750	3	0				
	SSF-1	upgradient	28-Nov-84	7.4325	7.4325	3	0				
						10		0.774		A	0.05
							14		>.539	A	0.05

NOTE: A - THERE HAS NOT BEEN A SIGNIFICANT CHANGE IN THIS PARAMETER

B - MOST LIKELY THERE HAS BEEN A SIGNIFICANT INCREASE (OR pH DECREASE) IN THIS PARAMETER

pH IS A LOG FINCTION

P - PROBABILITY FROM TABLE 7, n2 = 8 IN ATTACHMENT 1

CONFIDENCE INTERVAL DOES NOT MEET POWER FOR 0.01 SIGNIFICANCE LEVEL
FOR pH -- MINIMUM P = 0.012

PORT READING

TABLE 3. MODIFIED STUDENTS' t TEST FOR CONDUCTIVITY AT LANDFARMS II AND III

LANDFARM	MONITORING WELL #	MONITORING WELL # LOCATION	SAMPLING DATE	CONDUCTIVITY (umhos/cm)	ln CONDUCTIVITY	$\overline{x}$-bg	s^2-bg	$\sqrt{s^2\text{-bg}/n}$	$\overline{x}$-dg	t*	tc	STANDING
II	NSF-1	upgradient	27-Sep-83	19,250	9.8653							
	NSF-1	upgradient	06-Mar-84	30,000	10.3090							
	NSF-1	upgradient	12-Apr-84	29,500	10.2921							
	NSF-1	upgradient	03-Jun-84	29,750	10.3006							
	NSF-1	upgradient	20-Aug-84	25,750	10.1562							
	NSF-1	upgradient	28-Nov-84	21,750	9.9874							
	NSF-1	upgradient	20-Mar-85	21,500	9.9758							
	NSF-1	upgradient	01-Jul-85	23,250	10.0541	10.1175	0.0295	0.0608				
	NSF-2	downgradient	01-Jul-85	43,250	10.6748				10.6748	9.1686	1.8950	B
	NSF-3	downgradient	01-Jul-85	42,500	10.6573				10.6573	8.8808	1.8950	B
	NSF-4	downgradient	01-Jul-85	49,250	10.8047				10.8047	11.3063	1.8950	B
III	SSF-1	upgradient	27-Sep-83	26,000	10.1659							
	SSF-1	upgradient	06-Mar-84	44,500	10.7032							
	SSF-1	upgradient	12-Apr-84	44,000	10.6919							
	SSF-1	upgradient	03-Jun-84	50,500	10.8297							
	SSF-1	upgradient	20-Aug-84	50,000	10.8198							
	SSF-1	upgradient	28-Nov-84	44,750	10.7088							
	SSF-1	upgradient	20-Mar-85	45,000	10.7144							
	SSF-1	upgradient	01-Jul-85	45,500	10.7255	10.6699	0.0443	0.0744				
	SSF-2	downgradient	01-Jul-85	42,000	10.6454				10.6454	-0.3290	1.8950	A
	SSF-3	downgradient	01-Jul-85	35,500	10.4773				10.4773	-2.5878	1.8950	A
	SSF-4	downgradient	01-Jul-85	43,000	10.6690				10.6690	-0.0128	1.8950	A

NOTE: A - THERE HAS NOT BEEN A SIGNIFICANT CHANGE IN THIS PARAMETER

B - MOST LIKELY THERE HAS BEEN A SIGNIFICANT INCREASE (OR pH DECREASE) IN THIS PARAMETER

TABLE 4. MANN-WHITNEY U TEST FOR CONDUCTIVITY AT LANDFARMS II AND III

LANDFARM	MONITORING WELL #	MONITORING WELL # LOCATION	SAMPLING DATE	CONDUCTIVITY (umhos/cm)	ln CONDUCTIVITY	U-1	U-2 (pH only)	P-1	P-2 (pH only)	STANDING	CONFIDENCE INTERVAL
II	NSF-1	upgradient	27-Sep-84	19,250	9.8653	0					
	NSF-1	upgradient	20-Mar-85	21,500	9.9758	0					
	NSF-1	upgradient	28-Nov-84	21,750	9.9874	0					
	NSF-1	upgradient	01-Jul-85	23,250	10.0541	0					
	NSF-1	upgradient	20-Aug-84	25,750	10.1562	0					
	NSF-1	upgradient	12-Apr-84	29,500	10.2921	0					
	NSF-1	upgradient	03-Jun-84	29,750	10.3006	0					
	NSF-1	upgradient	06-Mar-84	30,000	10.3090	0					
	NSF-3	downgradient	01-Jul-85	42,500	10.6573						
	NSF-2	downgradient	01-Jul-85	43,250	10.6748						
	NSF-4	downgradient	01-Jul-85	49,250	10.8047						
						0		0.006		B	0.05
										B	0.01
III	SSF-1	upgradient	27-Sep-84	26,000	10.1659	0					
	SSF-3	downgradient	01-Jul-85	35,500	10.4773						
	SSF-2	downgradient	01-Jul-85	42,000	10.6454						
	SSF-4	downgradient	01-Jul-85	43,000	10.6690						
	SSF-1	upgradient	12-Apr-84	44,000	10.6919	3					
	SSF-1	upgradient	06-Mar-84	44,500	10.7032	3					
	SSF-1	upgradient	28-Nov-84	44,750	10.7088	3					
	SSF-1	upgradient	20-Mar-85	45,000	10.7144	3					
	SSF-1	upgradient	01-Jul-85	45,500	10.7255	3					
	SSF-1	upgradient	20-Aug-84	50,000	10.8198	3					
	SSF-1	upgradient	03-Jun-84	50,500	10.8297	3					
						12		0.539		A	0.05
										A	0.01

NOTE: A - THERE HAS NOT BEEN A SIGNIFICANT CHANGE IN THIS PARAMETER

B - MOST LIKELY THERE HAS BEEN A SIGNIFICANT INCREASE) IN THIS PARAMETER

SEE ATTACHMENT 1, TABLE J FOR N2 FOR PROBABILITIES (P-1 OR P-2) VERSUS U

PORT READING

TABLE 5. MODIFIED STUDENTS' t TEST FOR TOC AT LANDFARMS II AND III

LANDFARM	MONITORING WELL #	MONITORING WELL # LOCATION	SAMPLING DATE	TOC (mg/l)	ln TOC	$\bar{x}_{bg}$	s^2_{bg}	$\sqrt{s^2_{bg}/n}$	$\bar{x}_{dg}$	t*	tc	STANDING
II	NSF-1	upgradient	02-Jun-83	20.0000	2.9957							
	NSF-1	upgradient	27-Sep-83	20.0000	2.9957							
	NSF-1	upgradient	06-Mar-84	20.0000	2.9957							
	NSF-1	upgradient	03-Jun-84	20.0000	2.9957							
	NSF-1	upgradient	20-Aug-84	20.0000	2.9957							
	NSF-1	upgradient	28-Nov-84	10.0000	2.3026							
	NSF-1	upgradient	20-Mar-85	26.5000	3.2771							
	NSF-1	upgradient	01-Jul-85	11.2500	2.4204							
						2.8723	0.1098	0.1172				
	NSF-2	downgradient	01-Jul-85	51.5000	3.9416				3.9416	9.1250	1.8950	B
	NSF-3	downgradient	01-Jul-85	14.5000	2.6741				2.6741	-1.6914	1.8950	A
	NSF-4	downgradient	01-Jul-85	10.0000	2.3026				2.3026	-4.8624	1.8950	A
III	SSF-1	upgradient	02-Jun-83	20.0000	2.9957							
	SSF-1	upgradient	27-Sep-83	20.0000	2.9957							
	SSF-1	upgradient	06-Mar-84	20.0000	2.9957							
	SSF-1	upgradient	03-Jun-84	28.2500	3.3411							
	SSF-1	upgradient	20-Aug-84	20.0000	2.9957							
	SSF-1	upgradient	28-Nov-84	10.0000	2.3026							
	SSF-1	upgradient	20-Mar-85	10.0000	2.3026							
	SSF-1	upgradient	01-Jul-85	10.0000	2.3026							
						2.7790	0.1693	0.1455				
	SSF-2	downgradient	01-Jul-85	10.0000	2.3026				2.3026	-3.2752	1.8950	A
	SSF-3	downgradient	01-Jul-85	10.0000	2.3026				2.3026	-3.2752	1.8950	A
	SSF-4	downgradient	01-Jul-85	10.0000	2.3026				2.3026	-3.2752	1.8950	A

NOTE: A - THERE HAS NOT BEEN A SIGNIFICANT CHANGE IN THIS PARAMETER

B - MOST LIKELY THERE HAS BEEN A SIGNIFICANT INCREASE (OR pH DECREASE) IN THIS PARAMETER

TABLE 6. MANN-WHITNEY U TEST FOR TOC AT LANDFARMS II AND III

LANDFARM	MONITORING WELL #	MONITORING WELL # LOCATION	SAMPLING DATE	TOC (mg/l)	ln TOC	U-1	U-2 (pH only)	P-1	P-2 (pH only)	STANDING	CONFIDENCE INTERVAL
II	NSF-4	downgradient	01-Jul-85	10.0000	2.3026						
	NSF-1	upgradient	28-Nov-84	10.0000	2.3026	1					
	NSF-1	upgradient	01-Jul-85	11.2500	2.4204	1					
	NSF-3	downgradient	01-Jul-85	14.5000	2.6741						
	NSF-1	upgradient	02-Jun-83	20.0000	2.9957	2					
	NSF-1	upgradient	06-Mar-84	20.0000	2.9957	2					
	NSF-1	upgradient	03-Jun-84	20.0000	2.9957	2					
	NSF-1	upgradient	20-Aug-84	20.0000	2.9957	2					
	NSF-1	upgradient	27-Sep-83	20.0000	2.9957	2					
	NSF-1	upgradient	20-Mar-85	26.5000	3.2771	2					
	NSF-2	downgradient	01-Jul-85	51.5000	3.9416						
						14		).539		A	0.05
										A	0.01
III	SSF-1	upgradient	20-Mar-85	10.0000	2.3026	0					
	SSF-3	downgradient	01-Jul-85	10.0000	2.3026						
	SSF-2	downgradient	01-Jul-85	10.0000	2.3026						
	SSF-1	upgradient	28-Nov-84	10.0000	2.3026	2					
	SSF-4	downgradient	01-Jul-85	10.0000	2.3026						
	SSF-1	upgradient	01-Jul-85	10.0000	2.3026	3					
	SSF-1	upgradient	06-Mar-84	20.0000	2.9957	3					
	SSF-1	upgradient	27-Sep-83	20.0000	2.9957	3					
	SSF-1	upgradient	20-Aug-84	20.0000	2.9957	3					
	SSF-1	upgradient	02-Jun-83	20.0000	2.9957	3					
	SSF-1	upgradient	03-Jun-84	28.2500	3.3411	3					
						20		).539		A	0.05
										A	0.01

NOTE: A - THERE HAS NOT BEEN A SIGNIFICANT CHANGE IN THIS PARAMETER

B - MOST LIKELY THERE HAS BEEN A SIGNIFICANT INCREASE (OR pH DECREASE) IN THIS PARAMETER

P - PROBABILITY FROM TABLE 7, n2 = 8 IN ATTACHMENT 1

PORT READING

TABLE 7. MODIFIED STUDENTS' t TEST FOR TOX AT LANDFARMS II AND III

LANDFARM	MONITORING WELL #	MONITORING WELL # LOCATION	SAMPLING DATE	TOX (mg/l)	ln TOX	$\overline{x}$-bg	$s\text{-bg}^2$	$\sqrt{s\text{-bg}^2/n}$	$\overline{x}$-dg	t*	tc	STANDING
II	NSF-1	upgradient	02-Jun-83	0.3500	-1.0498							
	NSF-1	upgradient	27-Sep-83	0.2675	-1.3186							
	NSF-1	upgradient	06-Mar-84	0.1900	-1.6607							
	NSF-1	upgradient	03-Jun-84	0.4350	-0.8324							
	NSF-1	upgradient	20-Aug-84	0.4350	-0.8324							
	NSF-1	upgradient	28-Nov-84	0.3050	-1.1874							
	NSF-1	upgradient	20-Mar-85	0.0500	-2.9957							
	NSF-1	upgradient	01-Jul-85	0.0775	-2.5575							
						-1.5543	0.6546	0.2861				
	NSF-2	downgradient	01-Jul-85	0.3150	-1.1552				-1.1552	1.3954	1.8950	A
	NSF-3	downgradient	01-Jul-85	0.2850	-1.2553				-1.2553	1.0455	1.8950	A
	NSF-4	downgradient	01-Jul-85	0.3300	-1.1087				-1.1087	1.5580	1.8950	A
III	SSF-1	upgradient	27-Sep-83	0.6425	-0.4424							
	SSF-1	upgradient	06-Mar-84	0.2750	-1.2910							
	SSF-1	upgradient	12-Apr-84	0.1800	-1.7148							
	SSF-1	upgradient	03-Jun-84	0.1900	-1.6607							
	SSF-1	upgradient	20-Aug-84	0.2000	-1.6094							
	SSF-1	upgradient	28-Nov-84	0.2925	-1.2293							
	SSF-1	upgradient	20-Mar-85	0.0725	-2.6242							
	SSF-1	upgradient	01-Jul-85	0.2200	-1.5141							
						-1.5107	0.3689	0.2147				
	SSF-2	downgradient	01-Jul-85	0.1975	-1.6220				-1.6220	-0.5182	1.8950	A
	SSF-3	downgradient	01-Jul-85	0.1225	-2.0996				-2.0996	-2.7423	1.8950	A
	SSF-4	downgradient	01-Jul-85	0.2050	-1.5847				-1.5847	-0.3446	1.8950	A

NOTE: A - THERE HAS NOT BEEN A SIGNIFICANT CHANGE IN THIS PARAMETER

B - MOST LIKELY THERE HAS BEEN A SIGNIFICANT INCREASE (OR pH DECREASE) IN THIS PARAMETER

TABLE 8. MANN-WHITNEY U TEST FOR TOX AT LANDFARMS II AND III

LANDFARM	MONITORING WELL #	MONITORING WELL # LOCATION	SAMPLING DATE	TOX (mg/l)	ln TOX	U-1	U-2 (pH only)	P-1	P-2 (pH only)	STANDING	CONFIDENCE INTERVAL
II	NSF-1	upgradient	20-Mar-85	0.0500	-2.9957	0					
	NSF-1	upgradient	01-Jul-85	0.0775	-2.5575	0					
	NSF-1	upgradient	06-Mar-84	0.1900	-1.6607	0					
	NSF-1	upgradient	27-Sep-83	0.2675	-1.3186	0					
	NSF-3	downgradient	01-Jul-85	0.2850	-1.2553						
	NSF-1	upgradient	28-Nov-84	0.3050	-1.1874	1					
	NSF-2	downgradient	01-Jul-85	0.3150	-1.1552						
	NSF-4	downgradient	01-Jul-85	0.3300	-1.1087						
	NSF-1	upgradient	02-Jun-83	0.3500	-1.0498	3					
	NSF-1	upgradient	20-Aug-84	0.4350	-0.8324	3					
	NSF-1	upgradient	03-Jun-84	0.4350	-0.8324	3					
						10		0.387		A	0.05
										A	0.01
III	SSF-1	upgradient	20-Mar-85	0.0725	-2.6242	0					
	SSF-3	downgradient	01-Jul-85	0.1225	-2.0996						
	SSF-1	upgradient	06-Mar-84	0.1800	-1.7148	1					
	SSF-1	upgradient	03-Jun-84	0.1900	-1.6607	1					
	SSF-2	downgradient	01-Jul-85	0.1975	-1.6220						
	SSF-1	upgradient	20-Aug-84	0.2000	-1.6094	2					
	SSF-4	downgradient	01-Jul-85	0.2050	-1.5847						
	SSF-1	upgradient	01-Jul-85	0.2200	-1.5141	3					
	SSF-1	upgradient	27-Sep-83	0.2750	-1.2910	3					
	SSF-1	upgradient	28-Nov-84	0.2925	-1.2293	3					
	SSF-1	upgradient	02-Jun-83	0.6425	-0.4424	3					
						16		>0.539		A	0.05
										A	0.01

NOTE: A - THERE HAS NOT BEEN A SIGNIFICANT CHANGE IN THIS PARAMETER

B - MOST LIKELY THERE HAS BEEN A SIGNIFICANT INCREASE (OR pH DECREASE) IN THIS PARAMETER

P - PROBABILITY FROM TABLE 7, n2 = 8 IN ATTACHMENT 1

APPENDIX III

NJDEP Correspondence - March 26, 1987 and July 22, 1987

Let's protect our earth

REFINERY ENG. & CONST.

1987 MAR 30 AM 10: 56

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF WATER RESOURCES
CN 029
TRENTON, NEW JERSEY 08625

GEORGE G. McCANN, P.E.
DIRECTOR

DIRK C. HOFMAN, P.E.
DEPUTY DIRECTOR

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

MAR 26 1987

S.J. Breaux, Refinery Manager
Amerada Hess (Port Reading) Corporation
P.O. Box 6950
Woodbridge, NJ 07095

Re: Closure of Aeration Basins

Dear Mr. Breaux:

The Department approves the closure plans for the aeration basins dated February 1987 with the following additional requirements:

1) All standing water must be removed from each of the three basins as soon as practical so that all soil samples can be taken, analyzed and submitted to the Department for review prior to the addition of the clay/cement mixture to any of the units.

2) Upon receipt and review of the soil sampling results, the Department will specify the amount (if any) of contaminated subsoils to be removed. Should additional sampling be required to fully delineate the vertical and horizontal extent of any soil contamination identified, Hess will be so notified by the Department.

3) The Department considers soil to be contaminated if the levels of contaminants in the soil exceed those below.

Given a soil Cation Exchange Capacity of (mg/kg)

	<5	5-15	>15
Pb	125.5	250	500 ppm
Cr	100	100	100 ppm

4) Contaminated soils and all detritus (material above the synthetic liner) shall be removed to the landfarm areas.

5) Based on the results of the soil analyses the necessity and extent of ground water monitoring will be determined by the Department.

If you have any questions regarding this correspondence, please contact Henry Schuver of the Ground Water Quality Control Section of the Water Quality Management Element at (609) 292-8427.

Sincerely,

Ken Siet, Chief,
Ground Water Quality Control

c: Dr. T. Helfgott, Amerada Hess
Paul Rubbe, Amerada Hess

WQM239

Let's protect our earth

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF WATER RESOURCES
CN 029
TRENTON, NEW JERSEY 08625

GEORGE G. McCANN, P.E.
DIRECTOR

DIRK C. HOFMAN, P.E.
DEPUTY DIRECTOR

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

John Steinhauer, Refinery Manager
Amerada Hess (Port Reading) Corporation
P.O. Box 6950
Woodbridge, NJ 07095

JUL 22 1987

Re: Closure of Aeration Basins (soils)

Dear Mr. Steinhauer:

The Department has reviewed the results of the impoundment bottom soil sampling dated 29 May 1987. Because analyses of four of the ten soil samples taken from the aeration basins revealed chromium concentrations in excess of 100 ppm, the Department can not consider these four results as "statistical outliers". In addition, the rapid decrease in chromium content in the soil with increased depth below the basin's liner indicates that the chromium is not representative of natural background in the soil but has resulted from the operation of the basin.

However, in light of the NJPDES permit closure conditions for the South Landfarm, the Department will consider a 200 ppm chromium closure objective if Amerada Hess:

1) shows that the soils beneath the aeration basin's liners have a CEC greater than 5 meq./100 grams; and

2) includes a notice in their property deed.

Regarding item 2 above, Amerada Hess (Port Reading) Corporation shall record, in accordance with State law, a notation on the deed to the facility property that will in perpetuity notify any potential purchaser of the property that:

FILE COPY

1) The land has been used to manage industrial waste;

2) Its use is restricted, in that the soils underlying the former basins shall not be disturbed or moved to the surface; and

3) The survey plat and record of the type, location and quantity of industrial waste placed within the basins, and that underlying soils may contain greater than 100 ppm of chromium, have been filed with the local zoning authority or the authority with jurisdiction over local land use and the Department.

Regardless, Amerada Hess is hereby required to remove the contaminated soils from at least the sample areas EB-5 and SW-2. The soils to a depth of six inches in a ten square foot area surrounding these sample points shall be removed within 60 days of this notice. Additional samples of the soil to a six inch depth beneath the liners at the four corners of each of these areas shall be taken to determine if sufficient soil has been removed. These analyses shall also include hexavalent chrome to determine the hexavalent chromium content of the soil immediately below the liners. The Ground Water Quality Control Section shall be notified two weeks prior to the removal and sampling of the soils.

In addition, the detritus above the liner in the basins shall be removed to the North and No. 1 landfarms within 120 days of this notice.

Upon completion of all closure activities, Amerada Hess shall submit to the Department certification by a licensed Professional Engineer that closure has been performed in accordance with the approved closure plans.

If you have any questions regarding this correspondence, please contact Henry Schuver of the Ground Water Quality Control Section of the Water Quality Management Element at (609) 292-8427.

Sincerely,

Ken Siet, Chief,
Ground Water Quality Control

c: Dr. T. Helfgott, Amerada Hess
Paul Rubbe, Amerada Hess
WQM239

APPENDIX IV

Historic Aerial Photographs (1931-2007)

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1:115 ft.
AOC-5 Aeration Basins
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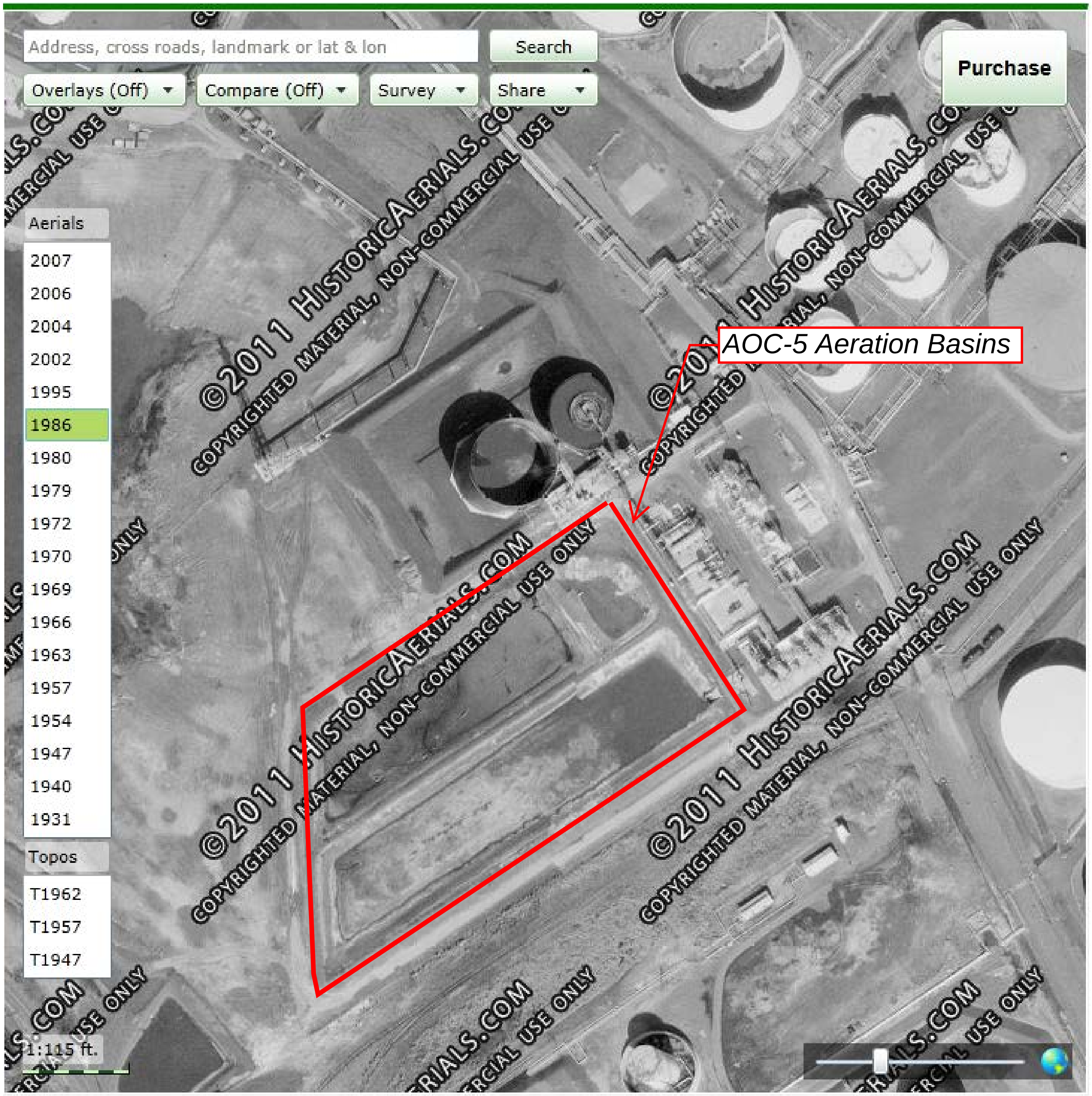
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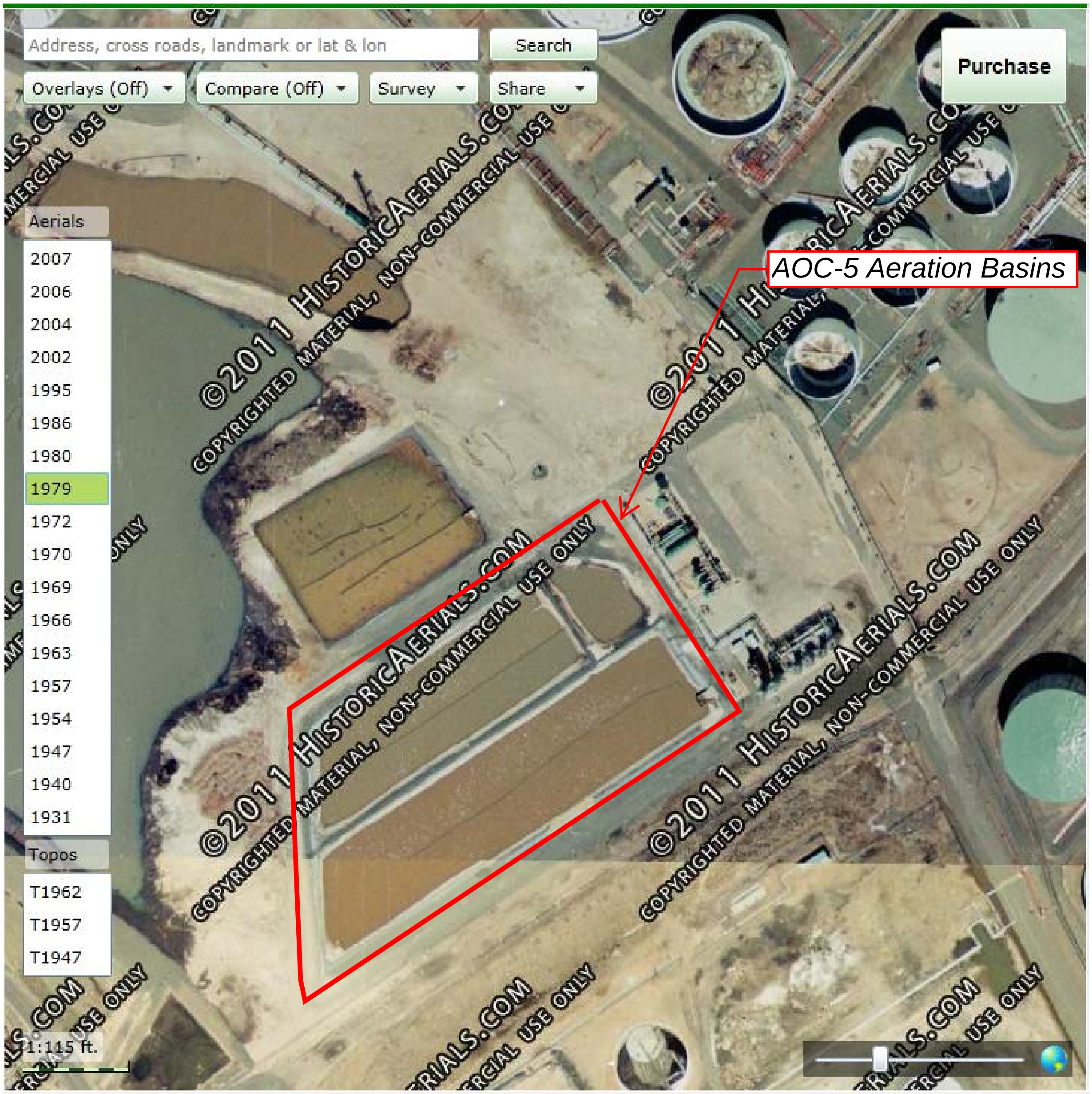
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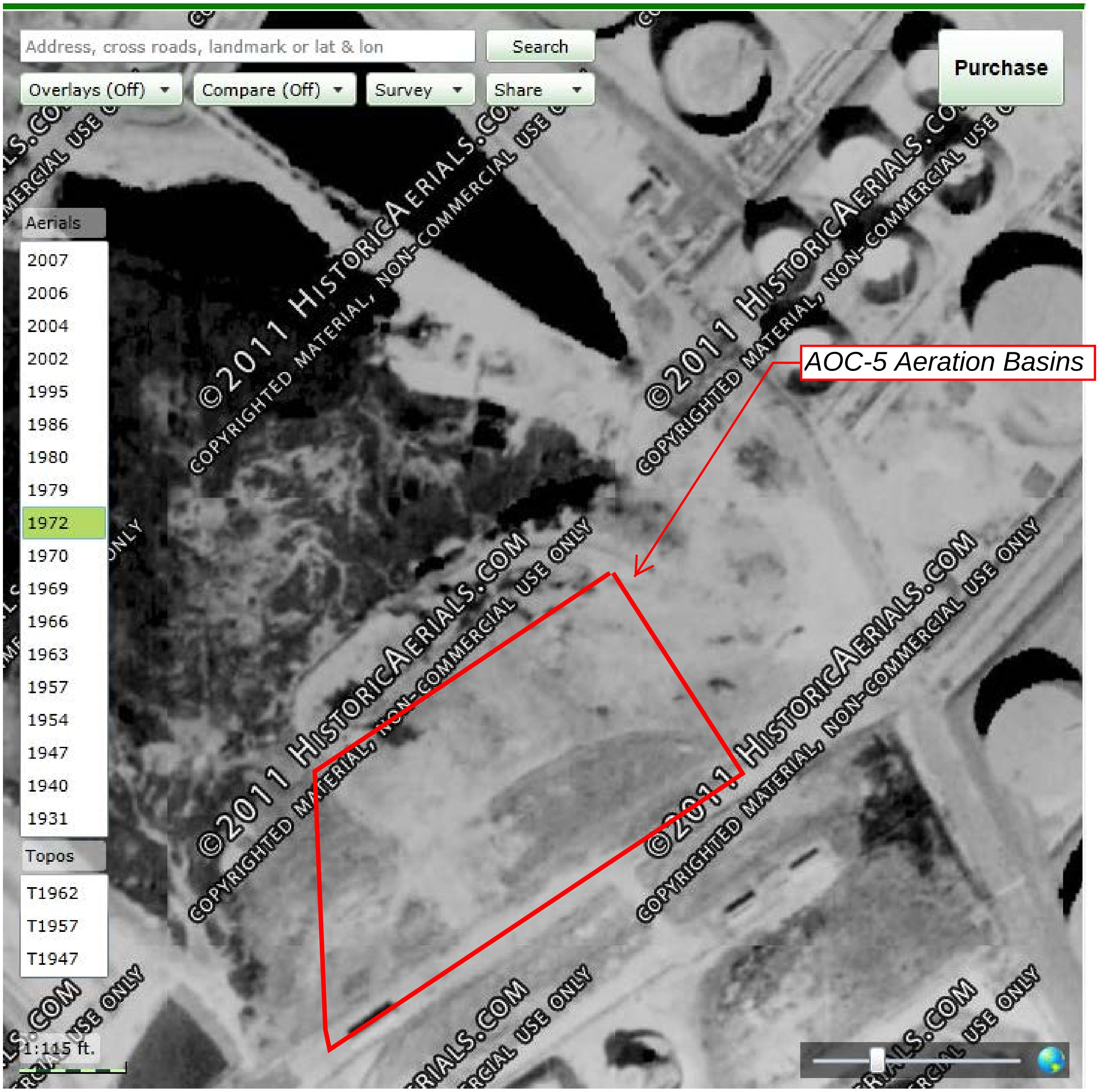

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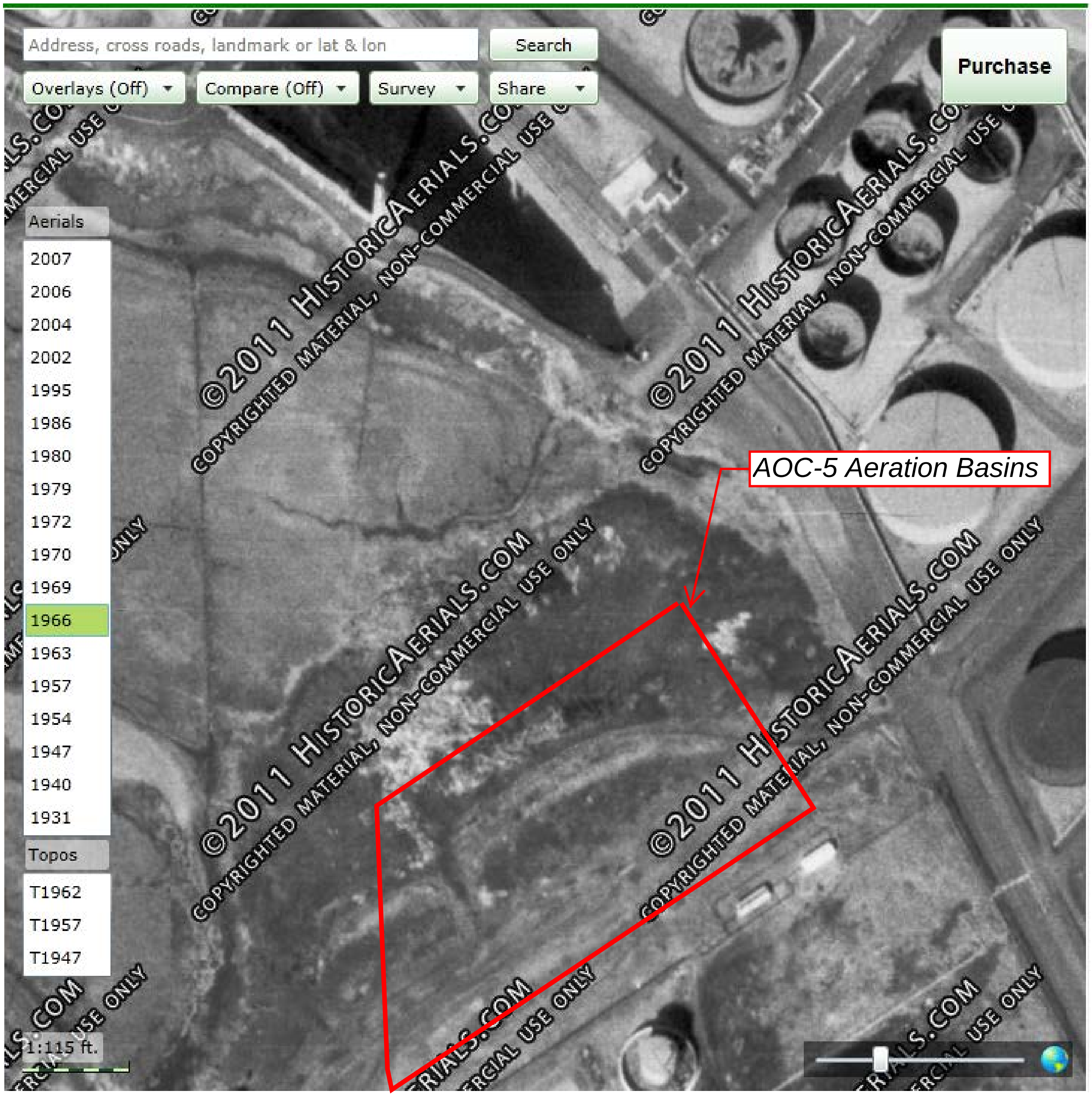
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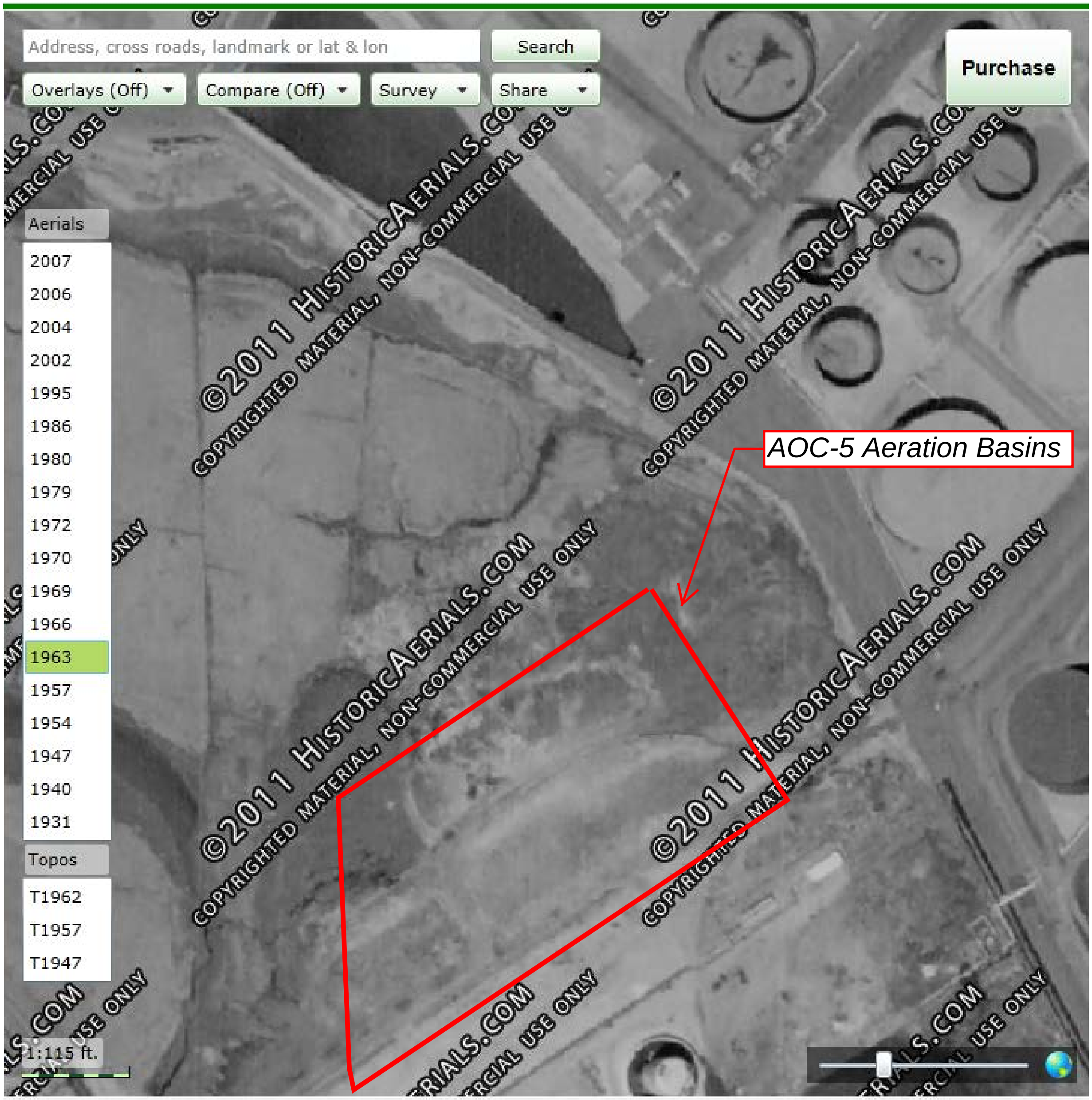
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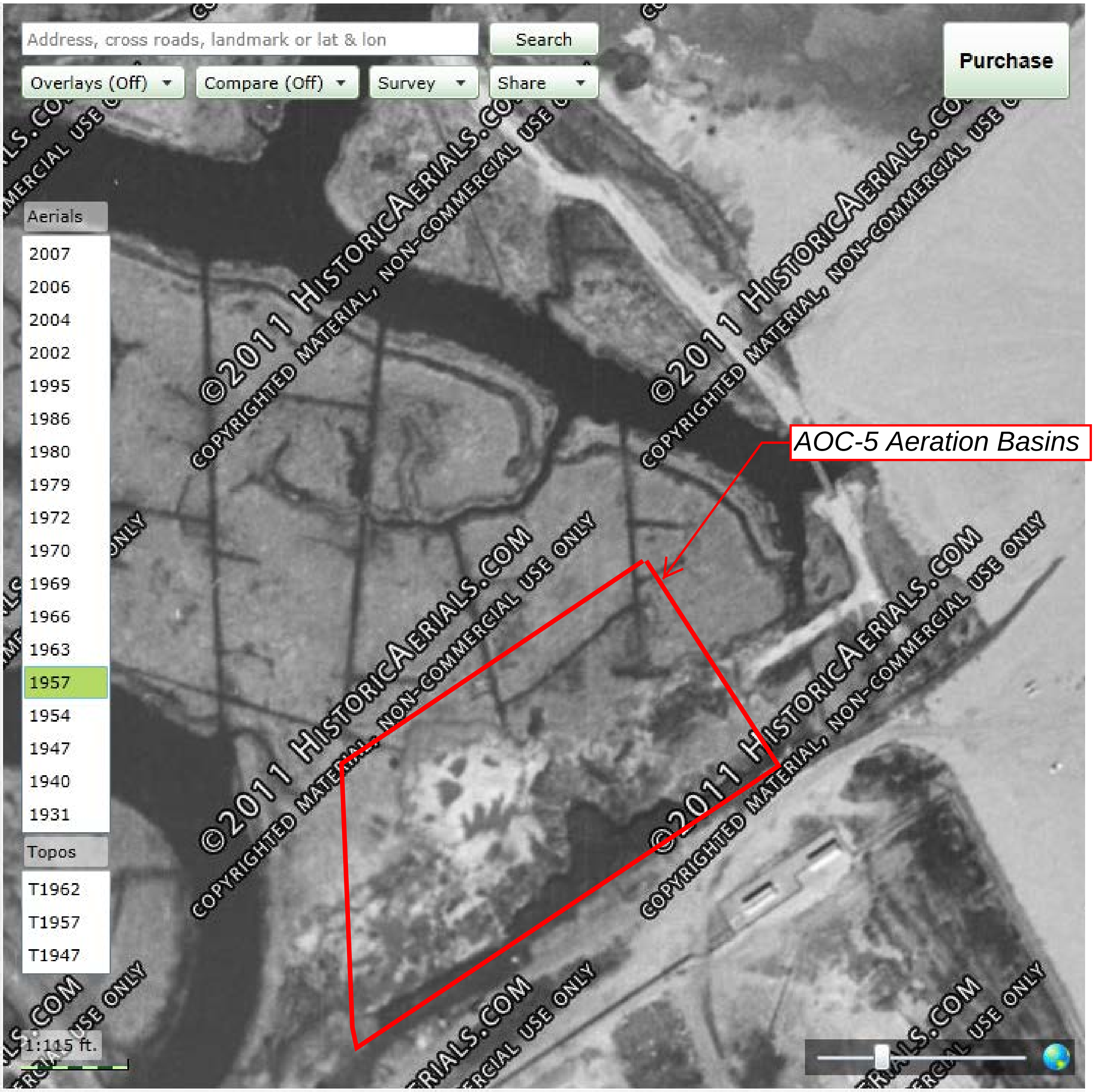
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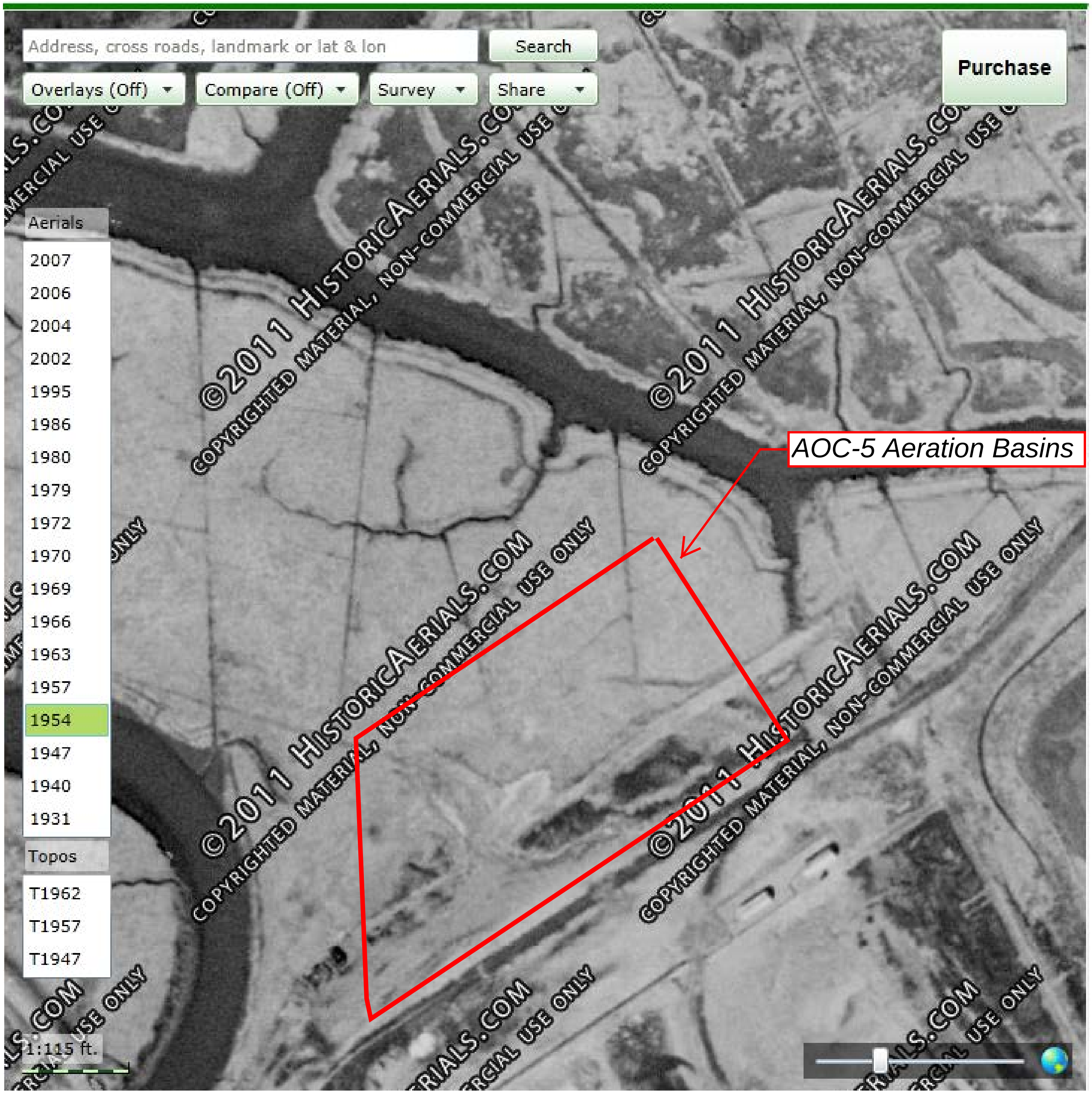

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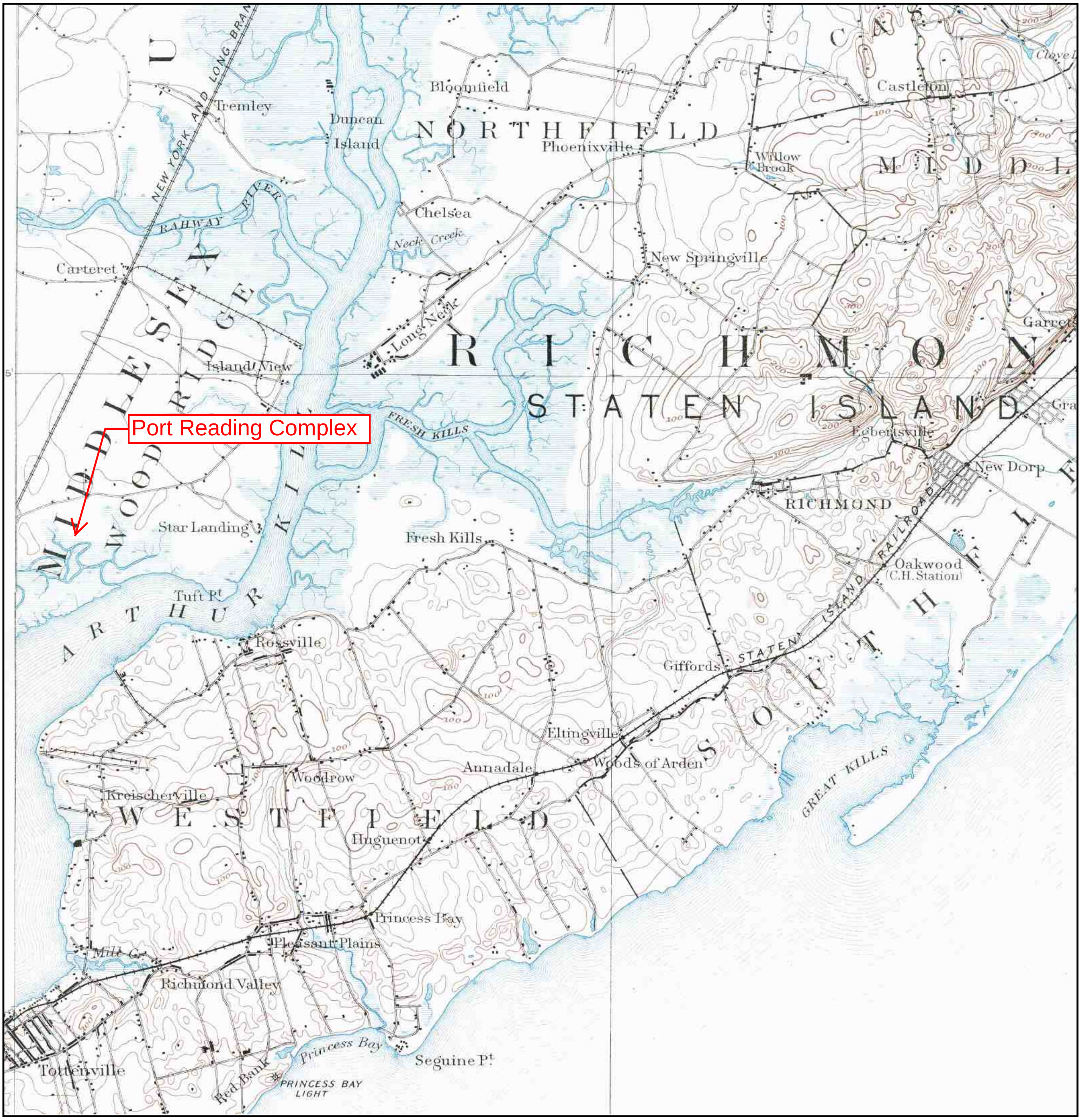
APPENDIX V

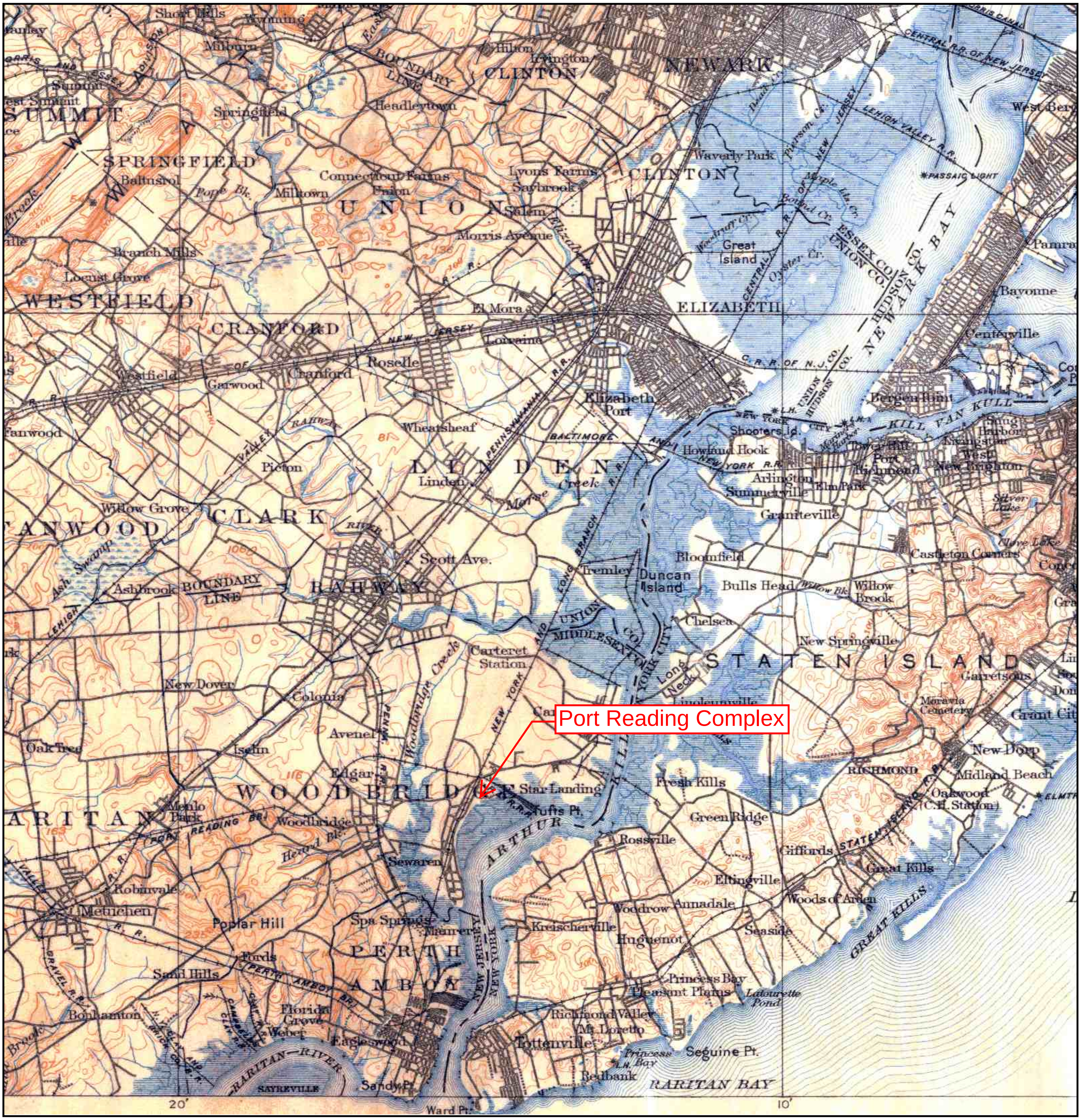
Historic Topographic Maps (1891-1981)

Historical Topographic Map



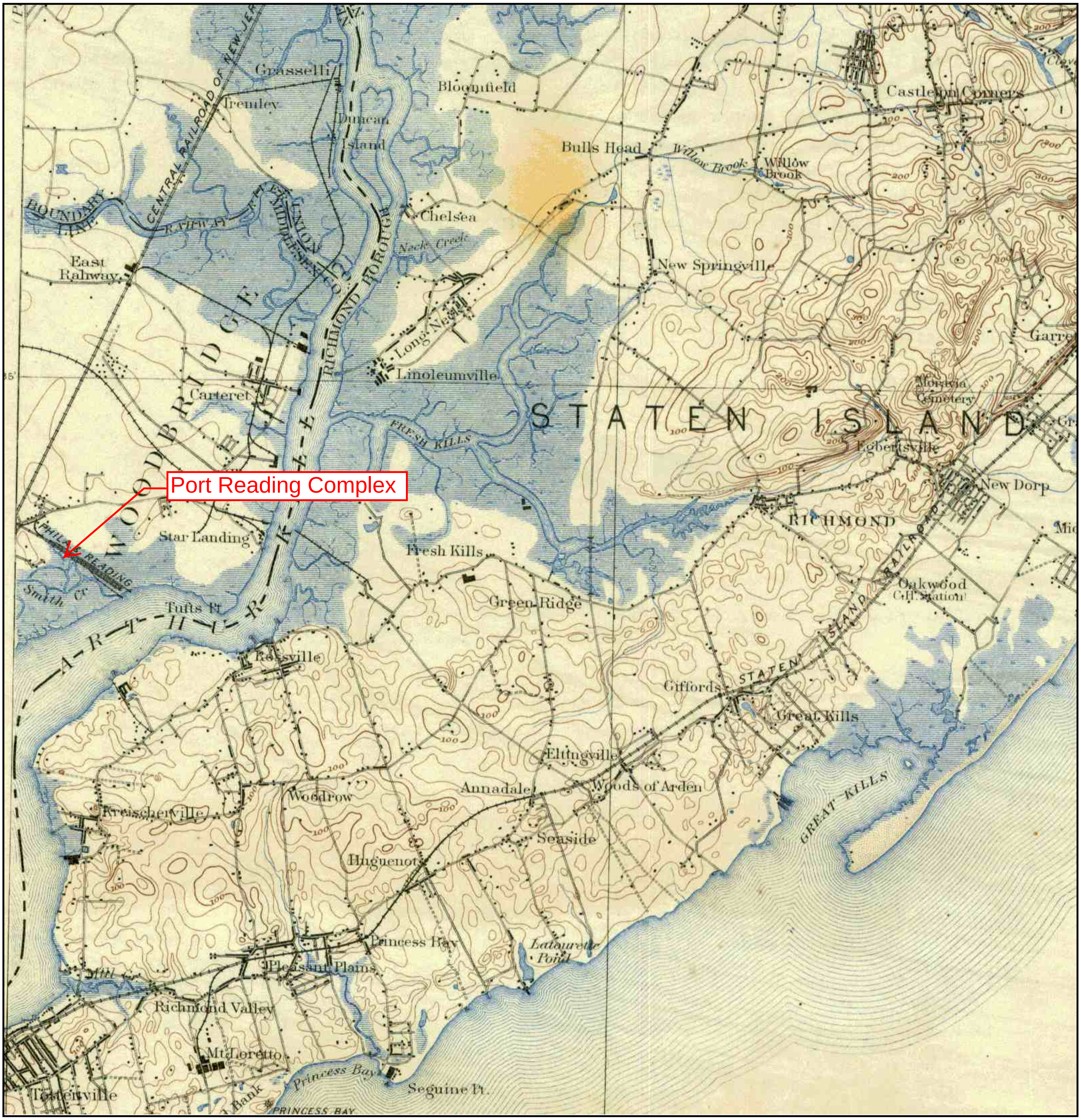
N	TARGET QUAD NAME: STATEN ISLAND MAP YEAR: 1891 SERIES: 15 SCALE: 1:62500	SITE NAME: Coal Dock Area ADDRESS: 1000 West Middlesex Avenue Woodbridge, NJ 07077 LAT/LONG: 40.5644 / 74.24	CLIENT: EnviroTrac Environmental Svcs. CONTACT: Dave Carlson INQUIRY#: 2445975.4 RESEARCH DATE: 03/19/2009

Historical Topographic Map



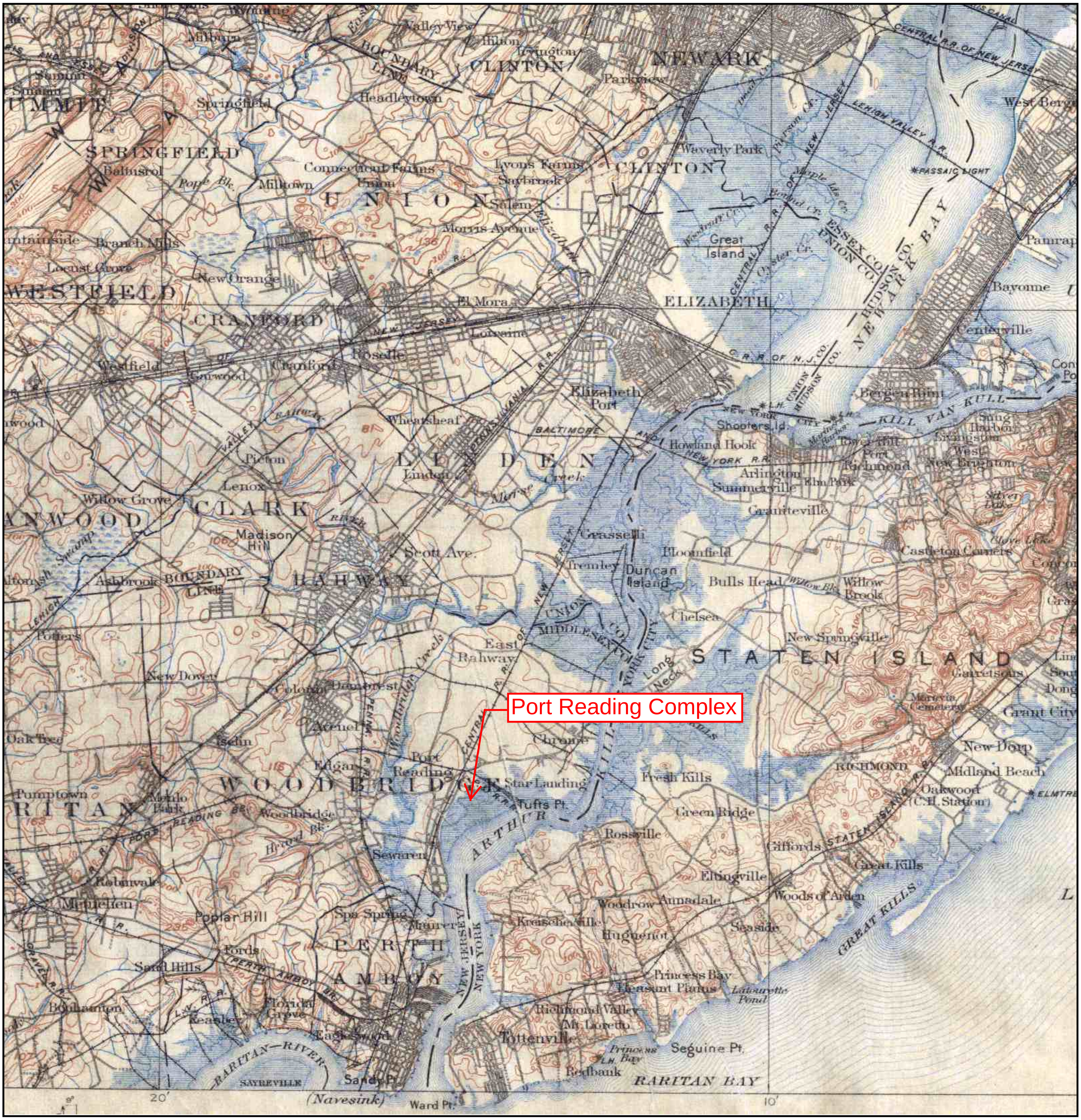
N	TARGET QUAD NAME: PASSAIC MAP YEAR: 1900 SERIES: 30 SCALE: 1:125000	SITE NAME: Coal Dock Area ADDRESS: 1000 West Middlesex Avenue Woodbridge, NJ 07077 LAT/LONG: 40.5644 / 74.24	CLIENT: EnviroTrac Environmental Svcs. CONTACT: Dave Carlson INQUIRY#: 2445975.4 RESEARCH DATE: 03/19/2009

Historical Topographic Map



N	TARGET QUAD NAME: STATEN ISLAND MAP YEAR: 1900 SERIES: 15 SCALE: 1:62500	SITE NAME: Coal Dock Area ADDRESS: 1000 West Middlesex Avenue Woodbridge, NJ 07077 LAT/LONG: 40.5644 / 74.24	CLIENT: EnviroTrac Environmental Svcs. CONTACT: Dave Carlson INQUIRY#: 2445975.4 RESEARCH DATE: 03/19/2009

Historical Topographic Map

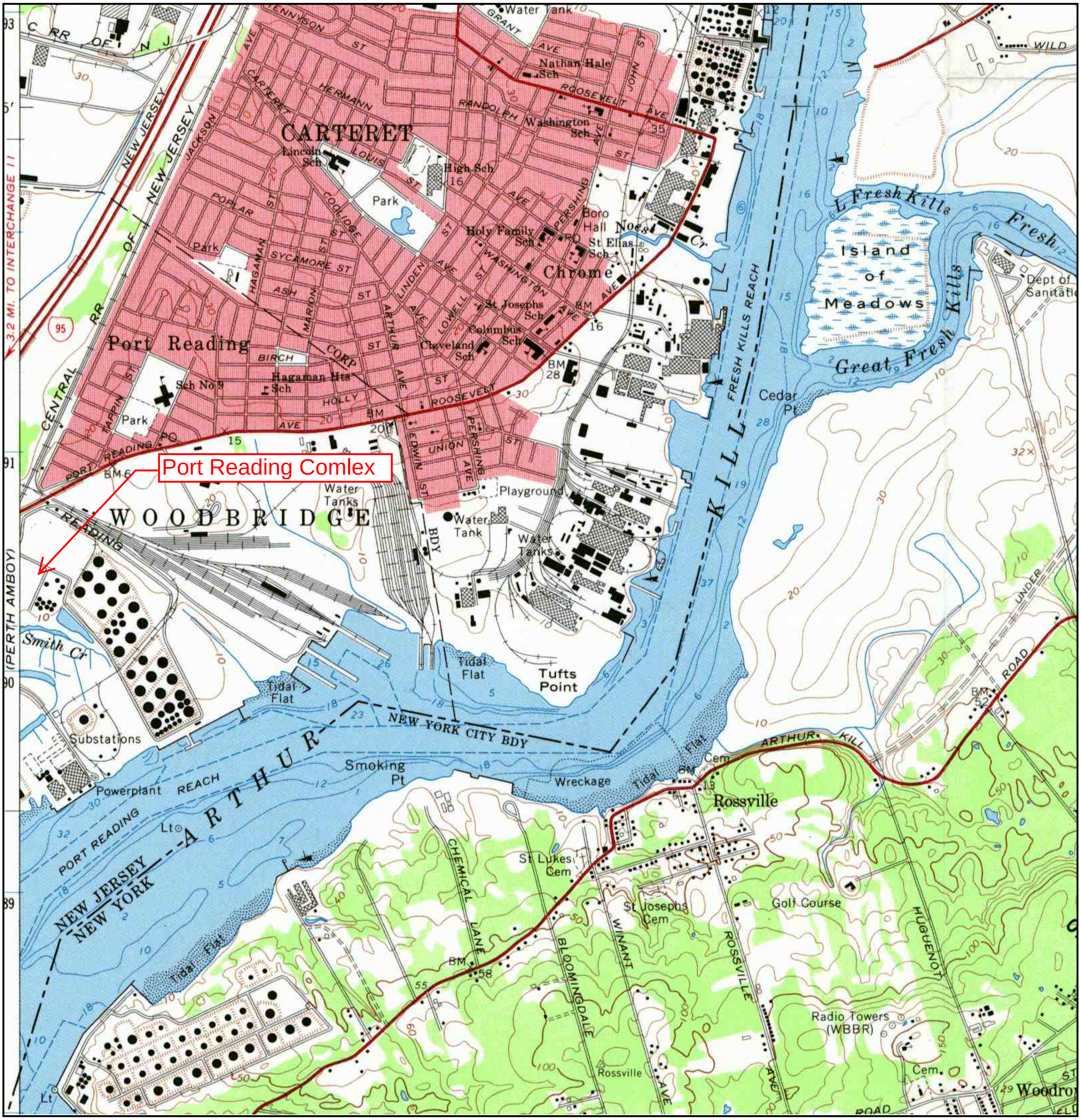


N	TARGET QUAD NAME: PASSAIC MAP YEAR: 1905 SERIES: 30 SCALE: 1:125000	SITE NAME: Coal Dock Area ADDRESS: 1000 West Middlesex Avenue Woodbridge, NJ 07077 LAT/LONG: 40.5644 / 74.24	CLIENT: EnviroTrac Environmental Svcs. CONTACT: Dave Carlson INQUIRY#: 2445975.4 RESEARCH DATE: 03/19/2009

Historical Topographic Map

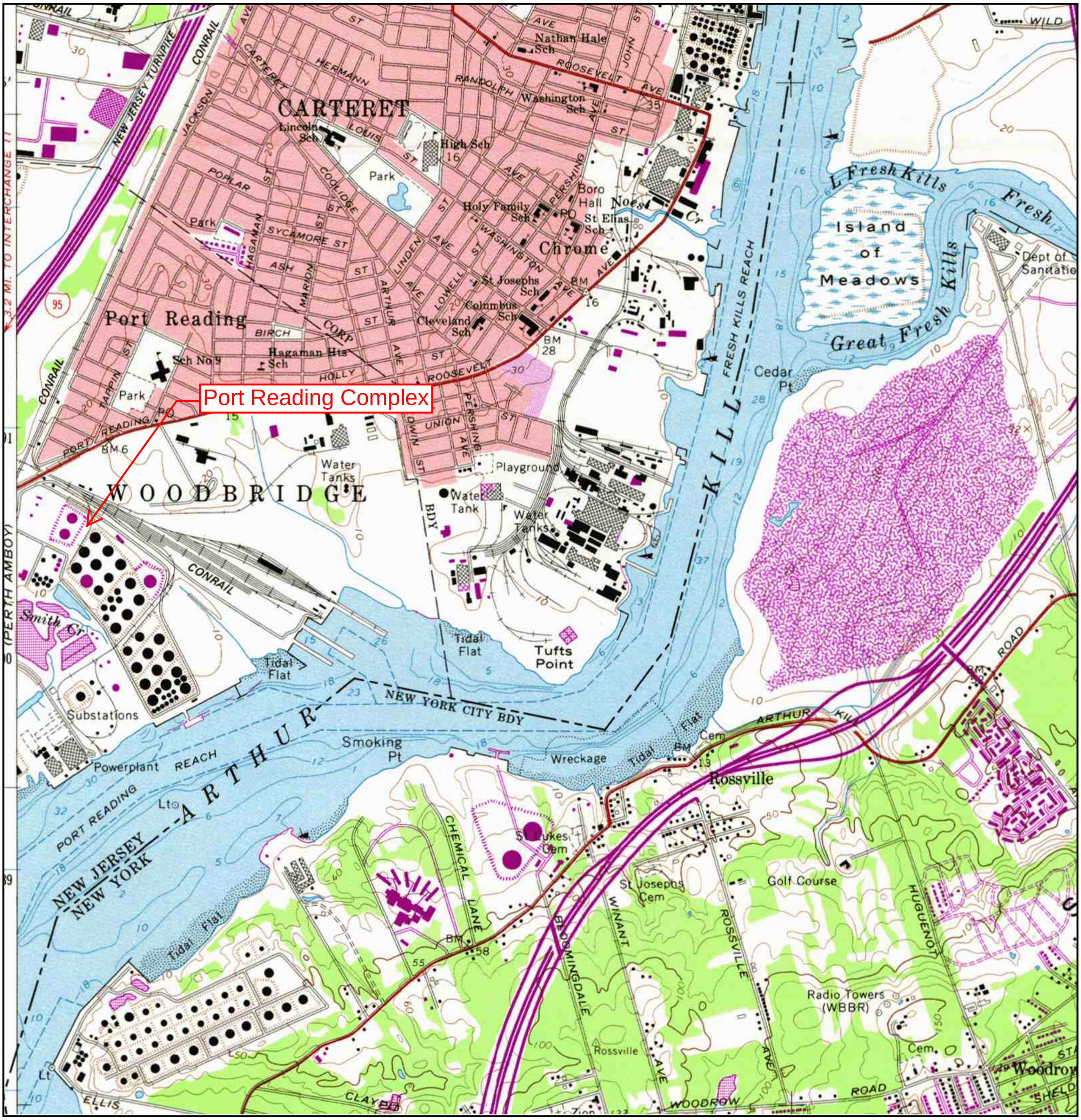
N ↑	TARGET QUAD NAME: ARTHUR KILL MAP YEAR: 1947 SERIES: 7.5 SCALE: 1:25000	SITE NAME: Coal Dock Area ADDRESS: 1000 West Middlesex Avenue Woodbridge, NJ 07077 LAT/LONG: 40.5644 / 74.24	CLIENT: EnviroTrac Environmental Svcs. CONTACT: Dave Carlson INQUIRY#: 2445975.4 RESEARCH DATE: 03/19/2009

Historical Topographic Map



N ↑	TARGET QUAD NAME: ARTHUR KILL MAP YEAR: 1966 SERIES: 7.5 SCALE: 1:24000	SITE NAME: Coal Dock Area ADDRESS: 1000 West Middlesex Avenue Woodbridge, NJ 07077 LAT/LONG: 40.5644 / 74.24	CLIENT: EnviroTrac Environmental Svcs. CONTACT: Dave Carlson INQUIRY#: 2445975.4 RESEARCH DATE: 03/19/2009

Historical Topographic Map



N	TARGET QUAD NAME: ARTHUR KILL MAP YEAR: 1981 PHOTOREVISED FROM:1966 SERIES: 7.5 SCALE: 1:24000	SITE NAME: Coal Dock Area ADDRESS: 1000 West Middlesex Avenue Woodbridge, NJ 07077 LAT/LONG: 40.5644 / 74.24	CLIENT: EnviroTrac Environmental Svcs. CONTACT: Dave Carlson INQUIRY#: 2445975.4 RESEARCH DATE: 03/19/2009

APPENDIX VI

Historic Fill Quadrangle Maps (Arthur Kill and Perth Amboy)

DEPARTMENT OF ENVIRONMENTAL PROTECTION
LAND USE MANAGEMENT
NEW JERSEY GEOLOGICAL SURVEY

The information shown here is subject to periodic update and revision.
Base map from U.S. Geological Survey, 1956. Photorevised 1981.
Digital data is available upon request from the New Jersey Geological Survey.

Fill mapping by S.D. Stanford
GIS cartography by M. Girard

HISTORIC FILL OF THE PERTH AMBOY QUADRANGLE

2004

EXPLANATION

The "Brownfield and Contaminated Site Remediation Act" (N.J.S.A. 58:10B-1 et seq.) requires the Department of Environmental Protection to map regions of the state where large areas of historic fill exist and make this information available to the public. This map shows areas of historic fill covering more than approximately 5 acres. For the purposes of this map, historic fill is non-indigenous material placed on a site in order to raise the topographic elevation of the site. No representation is made as to the composition of the fill or presence of contamination in the fill. Some areas mapped as fill may contain chemical-production waste or ore-processing waste that exclude them from the legislative definition of historic fill.

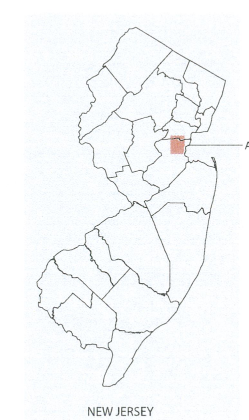
Fill was mapped from stereo aerial photography taken in March 1979, supplemented in places by planimetric aerial photography taken in the spring of 1991 and 1992. Additional areas of fill were mapped by comparing areas of swamp, marsh, and floodplain shown on archival topographic and geologic maps on file at the N. J. Geological Survey, dated between 1840 and 1910, to their modern extent. In a few places, fill was mapped from field observations and from drillers' logs of wells and borings.

Most urban and suburban areas are underlain by a discontinuous layer of excavated indigenous soil mixed with varying amounts of non-indigenous material. This material generally does not meet the definition of historic fill and is not depicted on this map. Also, there may be historic fills that are not detectable on aerial photography or by archival map interpretation and so are not shown on this map, particularly along streams in urban and suburban areas.

Use of the maps related to the Technical Rules, N.J.A.C. 7:26E

This map is provided for informational purposes only. The use of this map as the only source of information regarding the presence of historic fill at a site does not fulfill the diligent inquiry requirements of the Preliminary Assessment set forth at, N.J.A.C. 7:26E-3.1(c). This map may be used as one source of information to fulfill the requirements of the Site Investigation at, N.J.A.C. 7:26E-3.12. **This map is not intended to fulfill the Remedial Investigation requirements associated with historic fill at, N.J.A.C. 7:26E-4.6(b).**

Historic Fill
Non-Fill Area

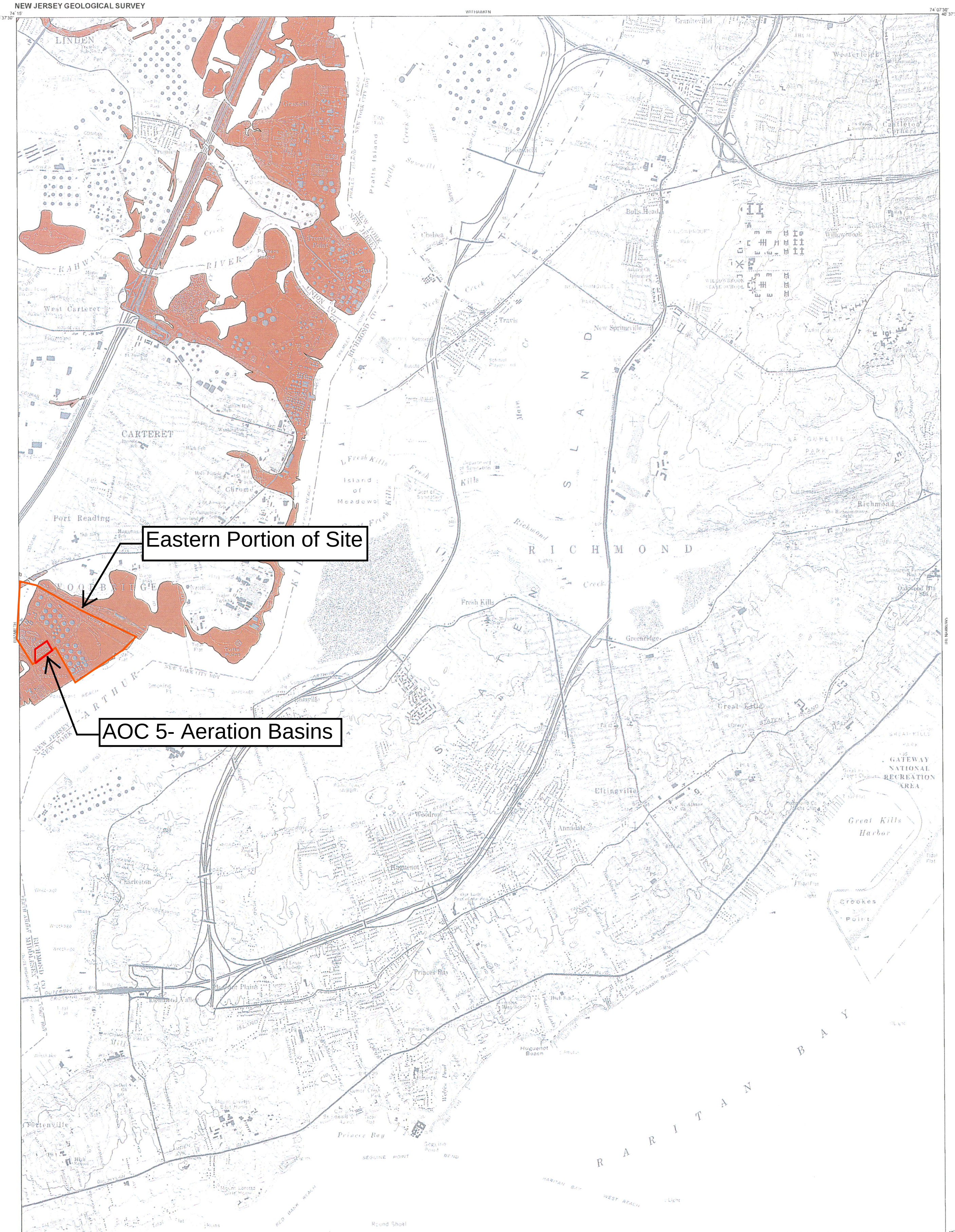


APPROXIMATE MEAN DECLINATION, 1996

SCALE 1:24 000

CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

DEPARTMENT OF ENVIRONMENTAL PROTECTION
LAND USE MANAGEMENT
NEW JERSEY GEOLOGICAL SURVEY



The information shown here is subject to periodic update and revision.
Base map from U.S. Geological Survey, 1966. Photorevised 1981.
Digital data is available upon request from the New Jersey Geological Survey.

Fill mapping by S.D. Stanford
GIS cartography by M. Girard

EXPLANATION

The "Brownfield and Contaminated Site Remediation Act" (N.J.S.A. 58:10B-1 et seq.) requires the Department of Environmental Protection to map regions of the state where large areas of historic fill exist and make this information available to the public. This map shows areas of historic fill covering more than approximately 5 acres. For the purposes of this map, historic fill is non-indigenous material placed on a site in order to raise the topographic elevation of the site. No representation is made as to the composition of the fill or presence of contamination in the fill. Some areas mapped as fill may contain chemical-production waste or ore-processing waste that exclude them from the legislative definition of historic fill.

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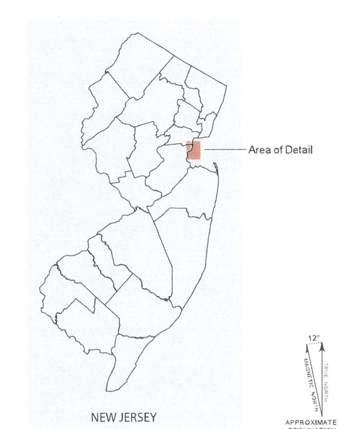
Use of the maps related to the Technical Rules, N.J.A.C. 7:26E

This map is provided for informational purposes only. The use of this map as the only source of information regarding the presence of historic fill at a site does not fulfill the diligent inquiry requirements of the Preliminary Assessment set forth at, N.J.A.C. 7:26E-3.1(c). This map may be used as one source of information to fulfill the requirements of the Site Investigation at, N.J.A.C. 7:26E-3.12. **This map is not intended to fulfill the Remedial Investigation requirements associated with historic fill at, N.J.A.C. 7:26E-4.6(b).**

Historic Fill
Non-Fill Area



APPROXIMATE MEAN DECLINATION, 1998

SCALE 1:24 000

CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

HISTORIC FILL OF THE ARTHUR KILL QUADRANGLE

2004

APPENDIX VII

NJDEP Correspondence - February 28, 2012

1988 FEB 29 A 8

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF WATER RESOURCES
CN 029
TRENTON, NEW JERSEY 08625

GEORGE G. McCANN, P.E.
DIRECTOR

DIRK C. HOFMAN
DEPUTY DIRECT

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. John Steinhauer, Refinery Manager
Amerada Hess (Port Reading) Corporation
P.O. Box 6950
Woodbridge, NJ 07095

FEB 2 4 1988

RE: Closure of Aeration Basins-letter of 16 February 1988

Dear Mr. Steinhauer:

The Department has reviewed your letter of 16 February 1988 detailing the closure activity for the east bay of the aeration basin. The Department approves of the methods used to delineate the additional contaminated soils and agrees that, once the remaining six yd^3 are removed as proposed, all soils of concern (with >200ppm Cr) will have been removed from the basin area and that those areas with >100 ppm Cr have been identified in the property deed.

The Department approves of the installation of the underdrain system with the diaphragm pump water removal system as recommended by GMS and Associates (letter of February 3, 1988) and described in your letter of February 16, 1988.

The Department also approves of the initiation of the placement of catalyst clays into the northern end of the east bay of the areation basin.

If you have any questions please contact Henry Schuver of the Ground Water Quality Control Section, at (609) 292-8427.

Sincerely,

Elizabeth Fernandez-Obregon for

Kenneth Siet, Section Chief,
Ground Water Quality Control

WQM239

C: Dr. T. Helfgott, Amerada Hess
Mr. Larry Karmel, Amerada Hess

APPENDIX VIII

Aeration Basins Sediment Characterization Plan

AMERADA HESS (PORT READING) CORPORATION
AERATION BASINS SEDIMENT CHARACTERIZATION PLAN

Prepared For:

Amerada Hess (Port Reading) Corporation
Port Reading, NJ

Prepared By:

Foster Wheeler Environmental Corporation
Woodbridge, NJ 07095

AMERADA HESS (PORT READING) CORPORATION
AERATION BASINS SEDIMENT CHARACTERIZATION PLAN

1.0 INTRODUCTION

The Amerada Hess (Port Reading) Corporation [AH(PR)C] refining facility currently processes low sulfur gas oils and residuals as feed to a Fluidized Catalytic Cracker (FCC) unit which converts gas oil into gasoline, fuel oil, and hydrocarbon products such as methane, ethane and liquefied petroleum gas (LPG). Refining operations at the site were initiated in 1958 with a Crude Topping Unit. This unit heat fractionated crude oil to distill the lighter end hydrocarbons from the heavier compounds. The refinery underwent various expansions from 1958-1970, including the addition of a Unifier/Platformer Unit, Distillate Unit, Cat Cracker Unit, Vacuum Unit, Alkylation Unit, Treating Unit, Propylene, and Fractionation Unit. The refinery was deactivated and placed into a stand-by mode in 1974 and used for the bulk storage of petroleum and petroleum products. AH(PR)C began to retrofit the facility in 1983 and the refinery was reactivated in April 1985.

During the refinery standby mode of operation (1974-1985), terminal operations were continued at the facility. To operate as a terminal, the refinery wastewater system was modified to treat stormwater run-off, which required a modification of the NJPDES wastewater discharge permit. Three synthetically lined aeration basins were used for biological treatment of process wastewater and stormwater for refinery operations and then as final polishing ponds for terminal stormwater run-off. These lined aeration basins began receiving treated stormwater from the existing API separator and the corrugated plate separators (used to capture free oil and collect petroleum hydrocarbons from the terminal operations) in 1974. **Figure 1** is a plot plan of the Port Reading Refinery showing the location of the Aeration Basins with respect to other facility features.

In 1983, Amerada Hess Corporation applied for a revised NJPDES permit to restart the refinery operations. An Advanced Industrial Wastewater Treatment System (AWTS) of "state-of-the-art" design was placed in service prior to re-activation of refinery in early 1985, thus ending operation of the aeration basins.

1.1 Background

The three basins adjoin as can be seen in **Figure 2**. The aeration basins are located in the southeast corner of the Port Reading refinery immediately southwest of the refinery's wastewater treatment system. The basins are parallel to the southeast fence adjoining the Public Service Electric and Gas Company (PSE&G) property and are immediately south of the AWTS.

The total surface area of the three basins is approximately 4.1 acres, including the surrounding dike areas. During their operational period, the three ponds had a combined surface water area of approximately 3.7 acres, an average water depth capacity of 8 feet, and an average above grade dike of 4 feet. These basins were interconnected and operated in series with the first basin receiving the separator liquid effluents. The first basin (Basin 1) is the smallest of the three basins with a surface area of approximately 0.33 acres. The effluent from this basin entered the adjoining second basin (Basin 2) to the south by a submerged 24 inch diameter pipe. The second basin had a surface water area of 1.2 acres. The effluent from this pond entered the third basin to the east (Basin 3) by a submerged 24 inch diameter pipe. Basin 3 is the largest with a surface area of approximately 2.1 acres.

The AWTS includes an API oil/water separator, corrugated plate separators, above ground equalization/surge tank, and an above grade activated sludge/clarifier system with final treatment by sand filtration and activated carbon adsorption. All of these treatment units are situated on concrete pads or are concrete basins. The NJDEP approved the permit application and issued a revised NJPDES permit to the Port Reading refinery. Since the modified wastewater treatment system included an above ground activated sludge wastewater treatment system, the existing lined aeration basins were no longer needed. Therefore, the NJDEP required submittal of a closure plan for the aeration basins as part of the final NJPDES Port Reading refinery groundwater monitoring/landfarming Permit No. NJ0028878.

AH(PR)C submitted an Aeration Basin Closure Plan to the NJDEP in February 1987. Generally, this plan proposed removal of sediment and soils that exceed specified closure criteria present in the Aeration Basins. The plan also proposed to fill the basins with dewatered catalyst fines that have been mixed with cement, after the soils remaining met the closure criteria specified in the table below. The NJDEP approved the Closure Plan with the closure criteria specified below in a March 26, 1987 letter.

Aeration Basins Closure Criteria

Constituent	Closure Levels if CEC < 5 mg/kg	Closure Levels if CEC 5-15 mg/kg	Closure Levels if CEC > 15 mg/kg
Lead	125.5 ppm	250 ppm	500 ppm
Chromium	100 ppm	100 ppm	100 ppm
Oil and Grease	4000 ppm	4000 ppm	4000 ppm

CEC - Cation Exchange Capacity

The closure plan proposed initiating closure of the aeration basins at Basin 3. Once the basins are all filled with dewatered catalyst fines, the entire aeration basin area will be covered with soil and shaped to a 1% slope. A final cover of top soil will be added and seeded with grass to control erosion.

Basin 3 is approaching its full capacity of catalyst fines. Therefore, closure of the remaining basins should be initiated in the near future. However, before these activities can be initiated, the sediment remaining in the other two aeration basins requires characterization to determine disposal requirements.

1.2 Historical Sediment Characterization

Sediment samples were collected from the aeration basins in 1986 and 1990 and submitted for analysis of Toxicity Characteristic Leachate Procedure (TCLP), Volatile Organic Compounds (VOCs), Semivolatile Organic Compounds (BNs), and Metals. Analytical data from these samples are included as **Appendix 1**. Chloroform and barium were detected in the 1986 sample at the respective concentrations of 0.228 and .270 milligrams per liter (mg/l). These values are well below the TCLP regulatory thresholds of 6.0 mg/l for chloroform and 100 mg/l for barium. Benzene and chromium were detected in the sediment sample collected during 1990. These constituents were detected well below the respective regulatory thresholds of 0.5 mg/l for benzene and 5.0 mg/l for chromium.

The above data indicate that the sediments present in the Aeration Basins requiring closure are non-hazardous. However, additional samples should be collected to verify the non-hazardous nature of the remaining sediments. Therefore, sediment samples will be collected from the remaining two basins and analyzed for RCRA Waste Characteristic Sampling Parameters as specified in 40 CFR 262.11. The Aeration Basins were Aggressive Biological Treatment (ABT) units during their operation, which exempts the sediments within the basins from the F037 hazardous waste classification as specified in 40 CFR 268.40. Consequently, this sampling plan is written to help determine if the basin sediments potentially exhibit RCRA Characteristics for Hazardous Wastes as specified in 40 CFR 262.11.

2.0 SEDIMENT WASTE CHARACTERIZATION WORKPLAN

Characterization samples collected from Basins 1 and 2 will be used to supplement existing sediment analytical data and ultimately help assess whether the basins sediments are RCRA non-hazardous. The sediment sampling plan was developed in accordance with the applicable procedures in 40 CFR 261 Appendix 1, Representative Sampling Methods, July 1997 and SW-846 EPA Test Methods for Evaluating Solid Wastes PB88-239223, Vol. 2 Chapter 9 Sampling Plan, September 1986.

Sediment Sampling Locations

The simple random sampling plan detailed in SW-846 Chapter 9 Sampling Plan, provides an easy way to collect representative, statistically significant data sets from homogeneous lagoon-type features **(Appendix 2)**. Based on the nature of the influent received at the basins during their active operation, the assumption is made that the basin sediments are both vertically and horizontally homogeneous in composition.

Historical analytical data, sample variance, and regulatory threshold values were used to determine the appropriate number of samples recommended to characterized the sludges in each lagoon. RCRA waste characterization, per SW-846 guidelines, is determined independently of waste volume. Statistical calculations to determine the appropriate number of samples to be collected from each lagoon were performed for benzene, barium, chromium, and chloroform, since these were the only parameters detected in previous sludge TCLP samples. SW-846 guidelines provide a formula to calculate, based upon historical data, the number of samples required to statistically prove if a material is non-hazardous. The historical analytical data and the SW-846 Sampling Plan Statistical formulas utilized to determine the number of samples required for RCRA characterization are presented on **Table 1**. Only one sample from each lagoon is required to statistically determine that the sludges are non-hazardous. However, the locations of the historic samples are not known and the SW-846 method recommends collection of additional samples for protection against poor estimates of sample mean and variance. Therefore, it is recommended that four sediment samples be collected from each lagoon.

The four sample locations for each basin were determined by overlaying an imaginary grid on each basin. Unit cells within the sampling grid for Basin 1 are 20 feet in length and width. Unit cells within the sampling grid for Basin 2 are 25 feet in length and width. Cells within each grid were assigned consecutive numbers. A random number generator was used to select the four cells within each basin to be sampled. **Figures 3** and **4** show the sample grid overlay for Basins 1 and 2, respectively. Cells 3, 4, 10, and 23 were selected for sampling in Basin 1. Cells 37, 39, 51, and 80 were selected for sampling in Basin 2.

Sediment Sampling Methods

Currently, standing water is present within Basins 1 and 2. The water present in Basin 2 will be pumped out, and the sediment allowed to dry, before sampling of this basin is conducted. However, due to the small size of Basin 1 relative to its total depth of 6-8 ft., the water within this basin will not be pumped out. Rather, the bottom sediment will be sampled using a flat bottomed rowboat. Wooden stakes will be placed along the berms of the basins to accurately mark out the sampling grid represented on **Figures 3** and **4**.

Experienced field personnel will log all sample material and record the observations in a field notebook. All non-dedicated field sampling equipment will be field decontaminated using EPA approved protocols, as specified in **Appendix 3.**

Basin 1 Sampling

Standing water currently present in Aeration Basin 1 will not be pumped out due to the depth of the Basin in relation to the length and width of the Basin. The steep slopes of the Basin walls would provide a potential health and safety hazard for sampling personnel while entering and exiting the Basin during sampling. Therefore, Basin 1 will be sampled using a flat bottomed rowboat. As previously indicated, wooden stakes will be driven into the Basin's berms to replicate the sample grid shown on **Figure 3.** The sample boat will be equipped with an anchor to maintain position during sample collection.

A Ponar Dredge will be used to sample the bottom sediment in Basin 1. The dredge will be lowered from the boat with a length of rope in the center of the grid square to be sampled. A messenger is not required to initiate sampling with a Ponar Dredge. The lifting action of the line on the dredge during retrieval forces the shells of the dredge to close, thereby collecting a sediment sample. Samples will be collected from the upper 4" of sediment, since this is the approximate maximum amount of sediment the dredge can grab. After retrieval, sediment from the dredge will be transferred into the appropriate laboratory provided containers.

Basin 2 Sampling

Since this basin is much shallower than Basin 1, the standing water present in Basin 2 will be pumped out prior to initiation of sampling activities. The sediment will be allowed to dry sufficiently for sampling personnel to walk into the Basin before sampling will be initiated. A hand auger will be used to collect samples from the upper 4"-6" of the Basin sediment. Samples will be transferred directly into laboratory provided containers from the auger bucket.

Sample Analyses

Sediment samples from each Basin will be analyzed in accordance with 40 CFR 261 Subpart C: Characteristics of Hazardous Wastes. The samples will be analyzed for TCLP VOC, BN, corrosivity, reactivity, and ignitability. Additionally, each sample will be analyzed for total concentrations of oil and grease, lead, and chromium since minimum concentrations for these parameters are required to achieve closure, as proposed in the approved Aeration Basin Closure Plan.

Quality Assurance/Quality Control (QA/QC) samples will be collected to ensure data quality since the sampling is being performed for RCRA waste characterization purposes. A trip blank for volatile analysis will accompany each bottle shipment from the laboratory. One equipment blank sample will be collected from each Basin to be sampled. The equipment blank sample will be analyzed for the same parameters as the sediment characterization samples. These QA/QC samples will allow for the accurate assessment of any potential field or laboratory introduced contamination.

Laboratory Methods and Procedures

Samples will be submitted to a certified analytical laboratory for analysis. The samples will be analyzed using SW-846 methodology. The specific analytical methodology to be used is shown in **Table 2**.

3.0 WORKPLAN IMPLEMENTATION SCHEDULE

A sampling and analysis workplan implementation schedule has been provided on **Table 3**.

4.0 REPORT OF FINDINGS

A report will be prepared for internal review after receipt of analytical results from the laboratory. This final report will be completed approximately two months following initiation of the sampling plan. The final report will present the findings from the characterization sampling and any sediment disposal requirements based on analytical data from the sediment samples.

TABLE 1
Statistical Calculations of the Appropriate Number of Samples to be Collected for RCRA Waste Classification

Benzene

Historical Detections (mg/l)		Variance (s^2) -	6.05E-05
1986 -	0.0016	$t =$	3.078
1990 -	0.0126	$t^2 =$	9.474084
		Regulatory Threshold (RT) =	0.5
		Average (x) =	0.0071
		RT-x =	0.4929
		$(RT-x)^2 =$	0.24295041
	RCRA samples (n) =	0.002359255	

Chromium

Historical Detections (mg/l)		Variance (s^2) -	2.20E-01
1986 -	0.006	$t =$	3.078
1990 -	0.67	$t^2 =$	9.474084
		Regulatory Threshold (RT) =	5
		Average (x) =	0.338
		RT-x =	4.662
		$(RT-x)^2 =$	21.734244
	RCRA samples (n) =	0.096094572	

Chloroform

Historical Detections (mg/l)		Variance (s^2) -	2.42E-04
1986 -	0.0228	$t =$	3.078
1990 -	0.0008	$t^2 =$	9.474084
		Regulatory Threshold (RT) =	6
		Average (x) =	0.0118
		RT-x =	5.9882
		$(RT-x)^2 =$	35.8585392
	RCRA samples (n) =	6.39381E-05	

Barium

Historical Detections (mg/l)		Variance (s^2) -	2.00E-04
1986 -	0.27	t =	3.078
1990 -	0.25	t^2 =	9.474084
		Regulatory Threshold (RT) =	100
		Average (x) =	0.26
		RT-x =	99.74
		$(RT\text{-}x)^2$ =	9948.0676
	RCRA samples (n) =	1.90471E-07	

$$s^2 = \frac{\sum_{i=1}^{n} x_i^2 - (\sum_{i=1}^{n} x_i)^2/b}{b-1}$$

$$n = \frac{t^2_{.20} s^2}{\Delta^2}, \text{ where } \Delta = RT - x$$

Note:

Statistical formulas were obtained from SW-846, Chapter 9, Sampling Plans, September 1986.

"n" - The number of samples to be collected for RCRA Waste Classification.

Half the minimum detection limit was used when a parameter was not detected.

"t" - Tabulated values for a two-tailed conficence interval and a probability of .20.

"b" - Number of historical samples.

TABLE 2
Analytical Methods

Parameter	Analytical Methodology
TCLP Volatiles	SW-846 8260
TCLP Semivolatiles	SW-846 8270
TCLP Metals	SW-846 6010
TCLP Pesticides	SW-846 8080
Corrosivity	SW-846 Chapter 7
Ignitability	SW-846 Chapter 7
Reactivity	SW-846 Chapter 7
Total Chromium	SW-846 6010
Total Lead	SW-846 6010
Oil and Grease	SW-846 9071

Note:
TCLP - Toxicity Characteristic Leachate Procedure.

TABLE 3

WORKPLAN IMPLEMENTATON SCHEDULE

AMERADA HESS PORT READING REFINERY AERATION BASIN SEDIMENT SAMPLING

	TASK	TIME (In Weeks)															
		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0	Workplan Approval																
1	Mobilization																
2	Sediment Sampling Event																
3	Sample Shipment and Laboratory Analysis																
4	Data Review and Report Preparation																

KEY:

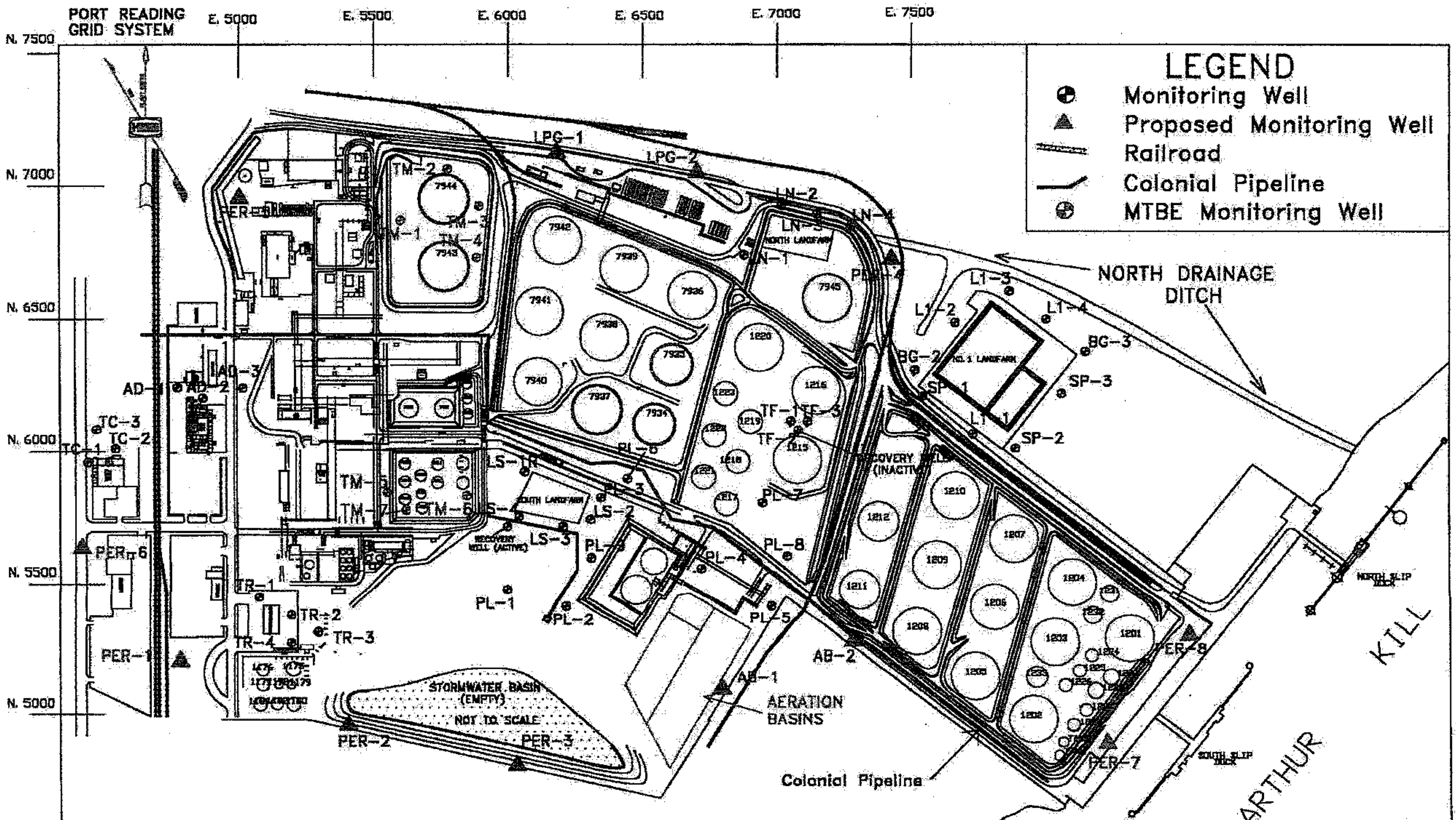
= COMPLETED

= IN PROGRESS

= NOT YET COMPLETED

file: S:\specprj\schedule.xls

Revision: 3/2/99



FWENC	PORT READING REFINERY PLOT PLAN	AMERADA HESS CORP. Port Reading Refinery 750 Cliff Road Port Reading, NJ
	Figure: 1 / Drawn By: BCF / Date: 10/27/98 / Scale: AS SHOWN	

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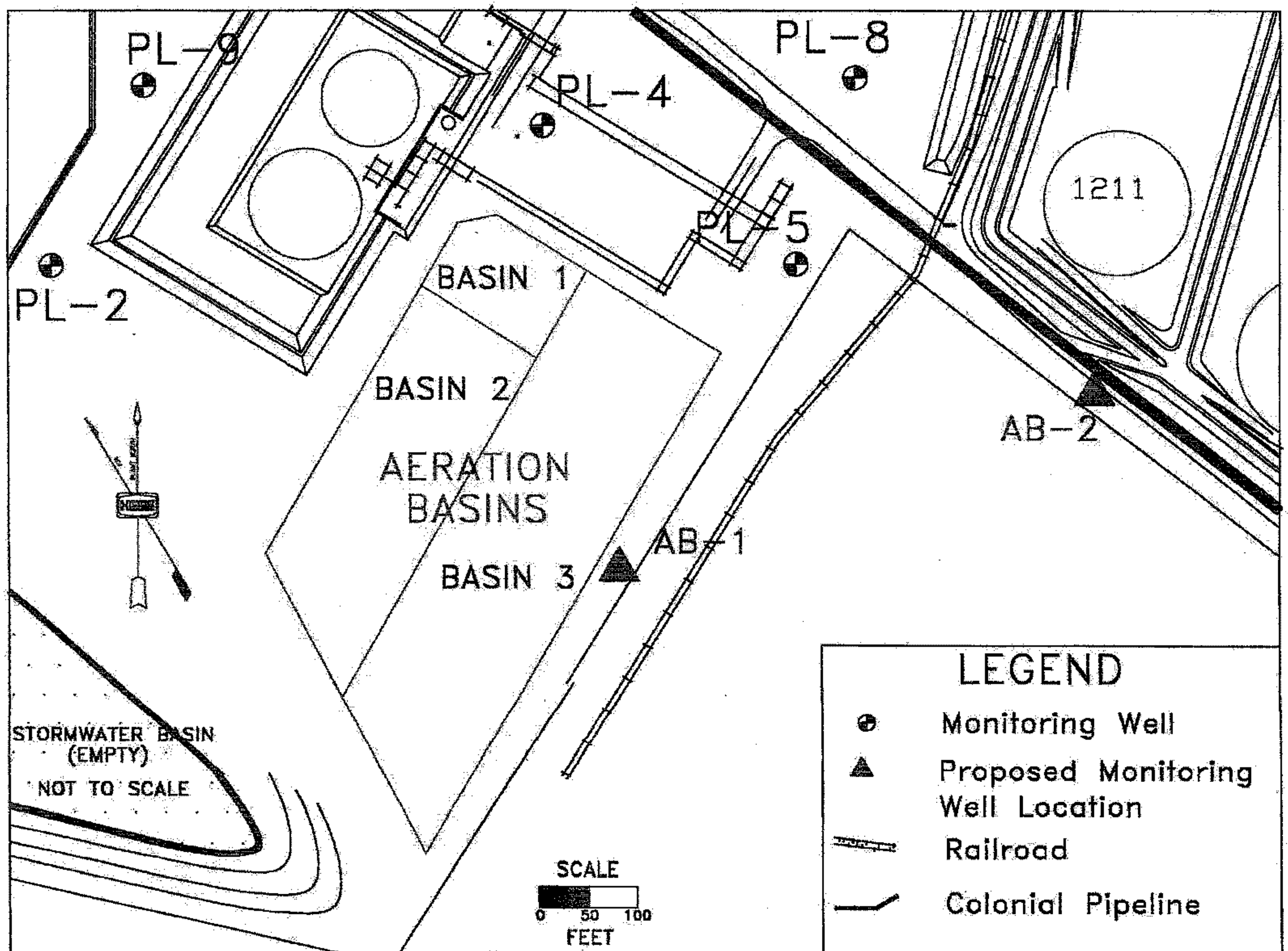
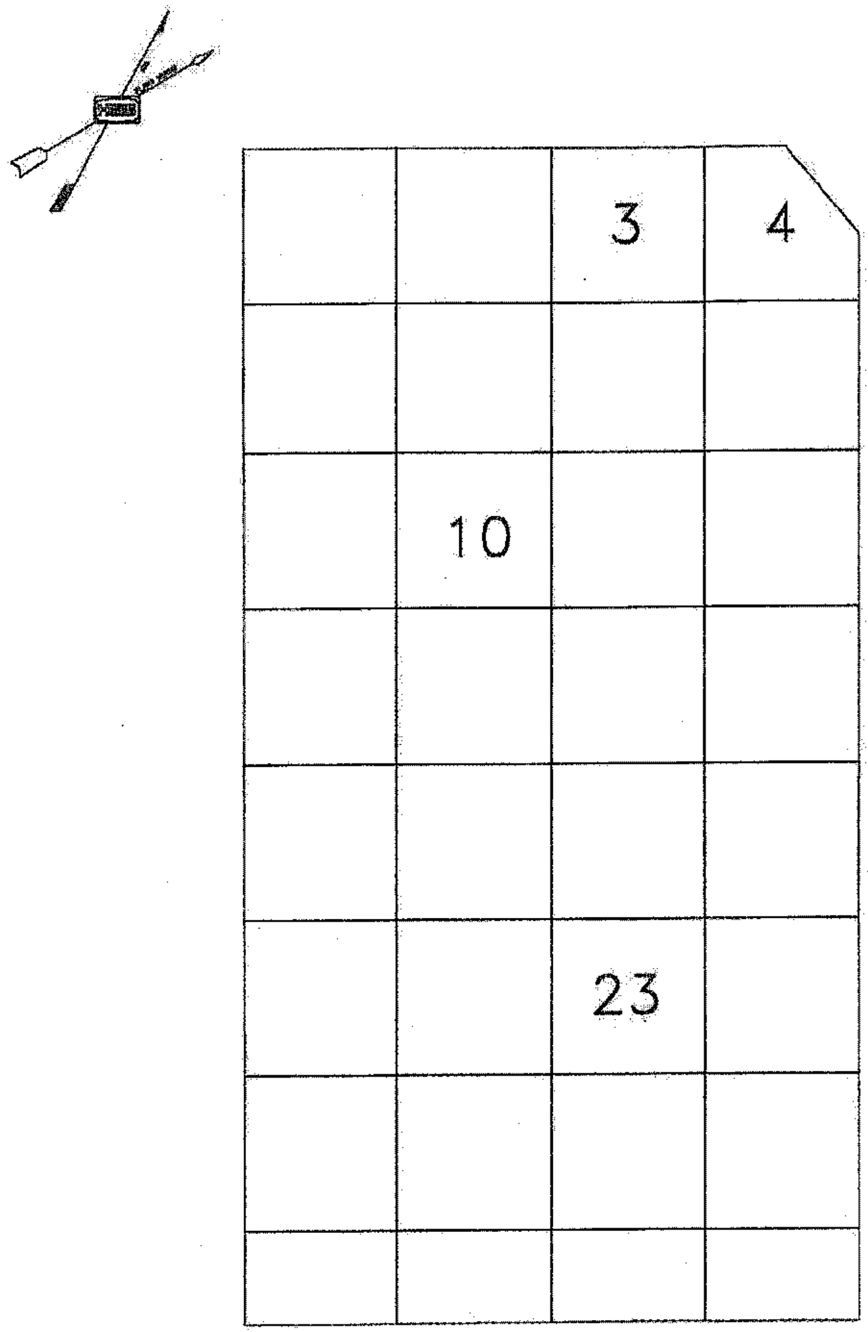


FWENC

AERATION BASINS PLOT PLAN

AMERADA HESS CORP.
Port Reading Refinery
750 Cliff Road
Port Reading, NJ

FIGURE: 2 | DRAWN BY: BCF | DATE: 10/14/98 | SCALE: AS SHOWN



SCALE

0 50 100

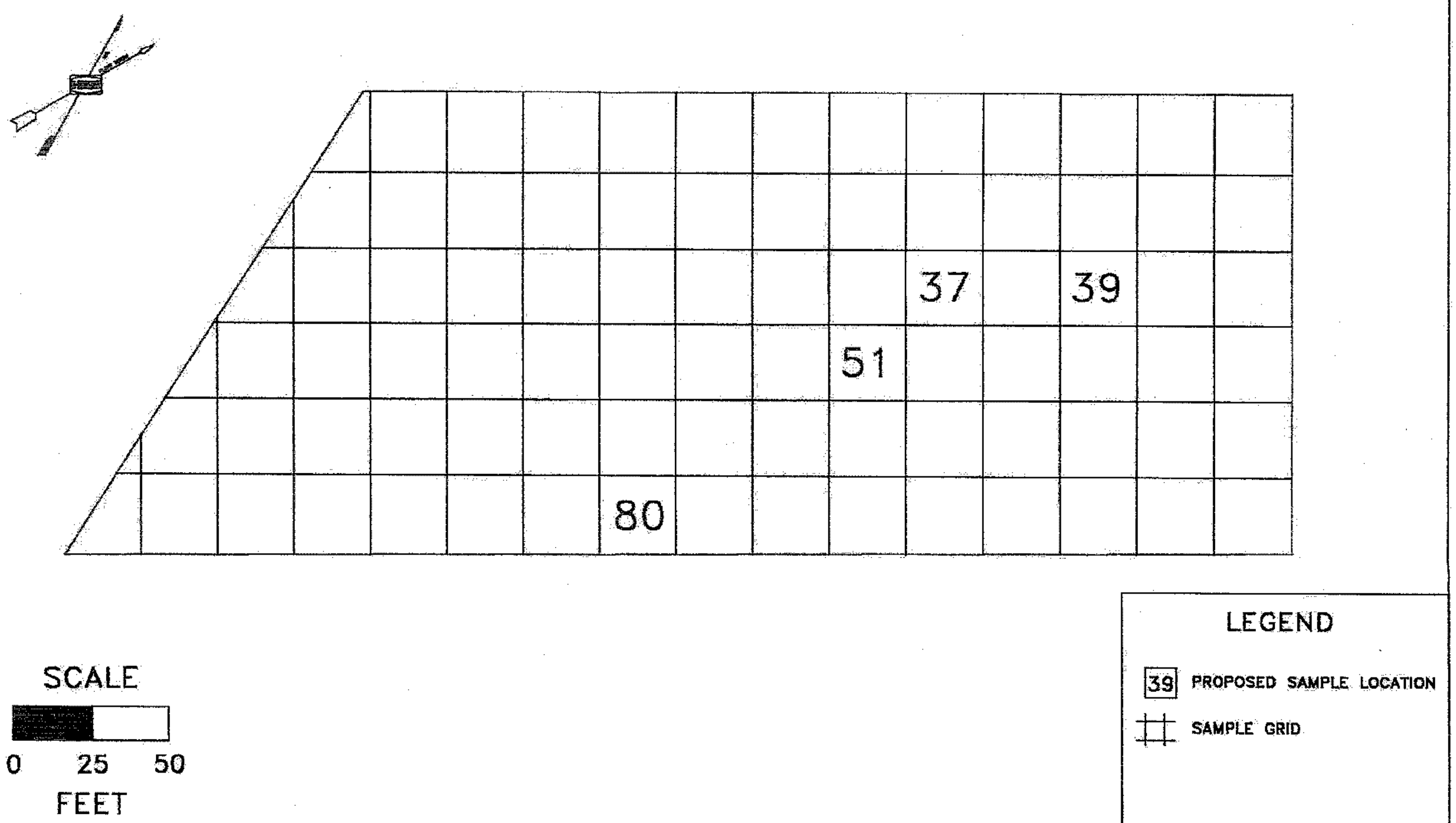
FEET

LEGEND

3 PROPOSED SAMPLE LOCATION

SAMPLE GRID

FWENC	AERATION BASIN 1 PLOT PLAN	AMERADA HESS CORP. Port Reading Refinery 750 Cliff Road Port Reading, NJ
	FIGURE: 3 | DRAWN BY: BCF | DATE: 1/13/99 | SCALE: AS SHOWN	



FWENC	AERATION BASIN 2 PLOT PLAN	AMERADA HESS CORP. Port Reading Refinery 750 Cliff Road Port Reading, NJ
	FIGURE: 4 · DRAWN BY: BCF · DATE: 1/15/99 · SCALE: AS SHOWN	

APPENDIX 1

HISTORICAL AERATION BASIN SEDIMENT TCLP ANALTYICAL DATA

ETC ENVIRONMENTAL TESTING and CERTIFICATION

SEP 24, 1986

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

TCLP – Volatiles – GC/MS Analysis (QR65)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
N4475	AMERADA HESS	AHCPTRDTCL	31S-1816	860820	0800	

Compound	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
	Sample Concen. ug/l	MDL ug/l	First ug/l	Second ug/l	Blank Data ug/l	Concen. Added ug/l	% Recov	Unspiked Sample ug/l	Concen. Added ug/l	% Recov
Acrylonitrile	ND	100	ND	ND	ND	80.0	89	ND	80.0	140
Benzene	ND	4.4	ND	ND	ND	18.0	101	ND	18.0	110
Carbon disulfide	ND	10	ND	ND	ND	18.0	93	ND	18.0	109
Carbon tetrachloride	ND	2.8	ND	ND	ND	18.0	98	ND	18.0	103
Chlorobenzene	ND	6.0	ND	ND	ND	18.0	98	ND	18.0	110
Chloroform	22.8	1.6	22.8	22.9	ND	18.0	93	27.4	18.0	113
1,2-Dichloroethane	ND	2.8	ND	ND	ND	18.0	90	ND	18.0	118
1,1-Dichloroethylene	ND	2.8	ND	ND	ND	18.0	96	ND	18.0	111
Isobutyl alcohol	ND	8.0	ND	ND	ND	200	86	ND	200	145
Methylene chloride	57.8	2.8	57.8	109	5.97	18.0	90	26.2	18.0	204a
Methyl ethyl ketone	BMDL	10	7.70	5.48	36.8	90.0	60	9.64	90.0	89
Pyridine	ND	80	ND	ND	ND	200	72	ND	200	98
1,1,1,2-Tetrachloroethane	ND	10	ND	ND	ND	50.0	97	ND	50.0	106
1,1,2,2-Tetrachloroethane	ND	6.9	ND	ND	ND	18.0	99	ND	18.0	134
Tetrachloroethylene	ND	4.1	ND	ND	ND	18.0	97	ND	18.0	114
Toluene	ND	6.0	ND	ND	ND	18.0	97	ND	18.0	110
1,1,1-Trichloroethane	ND	3.8	ND	ND	ND	18.0	102	ND	18.0	108
1,1,2-Trichloroethane	ND	5.0	ND	ND	ND	18.0	95	ND	18.0	109
Trichloroethylene	ND	1.9	ND	ND	ND	18.0	97	ND	18.0	101
Vinyl chloride	ND	10	ND	ND	ND	18.0	93	ND	18.0	121

a Spiked samples that contain compounds present at high levels do not provide valid spike recovery data.

SEP 21, 1986

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

TCLP - Base Neutral/Acid - GC/MS ANALYSIS (QR66)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
N4475	AMERADA HESS	AHCPTRDTCL	31S-1816	860820	0800	

Compound	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
	Sample Concen. ug/l	MDL ug/l	First ug/l	Second ug/l	Blank Data ug/l	Concen. Added ug/l	% Recov	Unspiked Sample ug/l	Concen. Added ug/l	% Recov
bis(2-Chloroethyl) ether	ND	5.7	ND	ND	ND	100	69	ND	100	81
o-Cresol	ND	10	ND	ND	ND	100	67	ND	100	70
m+p-Cresols	ND	10	ND	ND	ND	200	63	ND	200	64
1,2-Dichlorobenzene	ND	1.9	ND	ND	ND	100	81	ND	100	84
1,4-Dichlorobenzene	ND	4.4	ND	ND	ND	100	85	ND	100	87
2,4-Dinitrotoluene	ND	5.7	ND	ND	ND	100	93	ND	100	93
Hexachlorobenzene	ND	1.9	ND	ND	ND	100	84	ND	100	140
Hexachlorobutadiene	ND	.90	ND	ND	ND	100	98	ND	100	85
Hexachloroethane	ND	1.6	ND	ND	ND	100	102	1.14	100	80
Nitrobenzene	ND	1.9	ND	ND	ND	100	82	ND	100	79
Pentachlorophenol	ND	2.6	ND	ND	ND	100	117	ND	100	78
Phenol	2.43	1.5	ND	ND	ND	100	38	ND	100	42
2,3,4,6-Tetrachlorophenol	ND	10	ND	ND	ND	100	75	ND	100	76
2,4,5-Trichlorophenol	ND	10	ND	ND	ND	100	80	ND	100	78
2,4,6-Trichlorophenol	ND	2.7	ND	ND	ND	100	92	ND	100	94

SEP 19, 1986

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

TCLP - Pest & Herb Compounds - GC Analysis (QR67)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
N4475	AMERADA HESS	AHCPTRDTCL	31S-1816	860820	0800	

Compound	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
	Sample Concen. ug/l	MDL* ug/l	First ug/l	Second ug/l	Blank Data ug/l	Concen. Added ug/l	% Recov	Unspiked Sample ug/l	Concen. Added ug/l	% Recov
Chlordane	ND	2.2	ND	ND	ND	10	82	ND	11	87
Heptachlor	ND	.9	ND	ND	ND	2	105	ND	2	105
Endrin	ND	.9	ND	ND	ND	4a	103	ND	4a	105
Lindane	ND	.9	ND	ND	ND	4a	103	ND	4a	100
Methoxychlor	ND	2.3	ND	ND	ND	5	100	ND	5	100
Toxaphene	ND	9.0	ND	ND	ND	10	97	ND	11	106
2,4-D	ND	110	ND	ND	ND	100	45	ND	90.9	52
2,4,5-TP (Silvex)	ND	11	ND	ND	ND	10.0	103	ND	9.09	116

a Combined concentration due to coelution.

SEP 24, 1986
METALS

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

TCLP – Toxicity Characteristic Leaching Procedure – METALS ANALYSIS (QR68)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
N4475	AMERADA HESS	AHCPTRDTCL	31S-1816	860820	0800	

Compound	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
	Sample Concen. ug/l	MDL ug/l	First	Second	Blank Data	Concen. Added	% Recov	Unspiked Sample	Concen. Added	% Recov
Arsenic	BMDL	20	-	-	-	-	-	-	-	-
Barium	270	3.0	-	-	-	-	-	-	-	-
Cadmium	ND	3.3	-	-	-	-	-	-	-	-
Chromium	ND	12	-	-	-	-	-	-	-	-
Lead	ND	54	-	-	-	-	-	-	-	-
Mercury	ND	2.0	-	-	-	-	-	-	-	-
Selenium	BMDL	10	-	-	-	-	-	-	-	-
Silver	ND	13	-	-	-	-	-	-	-	-
Nickel	BMDL	13	-	-	-	-	-	-	-	-
Thallium	BMDL	25	-	-	-	-	-	-	-	-

ETC

SEP 7, 199(
QV60380

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

TCLP – Volatile Compounds – GC/MS Analysis (QRA4)

AERATION BASINS

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
FB1987	AMERADA HESS	AHCPTRDPRW	XPRW-COMP	900627		0

Compound	Results: Sample Concen. ug/l	Results: MDL ug/l	QC Replicate: First ug/l	QC Replicate: Second ug/l	QC Blank and Spiked Blank: Blank Data ug/l	QC Blank and Spiked Blank: Concen. Added ug/l	QC Blank and Spiked Blank: % Recov	QC Matrix Spike: Unspiked Sample ug/l	QC Matrix Spike: Concen. Added ug/l	QC Matrix Spike: % Reco
Vinyl chloride	ND	10	54.5	52.3	ND	50.0	97	ND	50.0	109
1,1-Dichloroethylene	ND	2.8	51.9	54.8	ND	50.0	101	ND	50.0	104
Chloroform	ND	1.6	52.9	53.1	ND	50.0	102	ND	50.0	106
1,2-Dichloroethane	ND	2.8	53.8	53.0	ND	50.0	107	ND	50.0	108
Methyl ethyl ketone	ND	10	43.9	28.9	ND	50.0	79	ND	50.0	88
Carbon tetrachloride	ND	2.8	49.0	51.4	ND	50.0	100	ND	50.0	98
Trichloroethylene	ND	1.9	48.9	49.9	ND	50.0	95	ND	50.0	98
Benzene	12.6	4.4	51.3	50.6	ND	50.0	92	ND	50.0	103
Tetrachloroethylene	ND	4.1	48.3	45.8	ND	50.0	92	ND	50.0	97
Chlorobenzene	ND	6.0	49.0	46.1	ND	50.0	99	ND	50.0	98

ETC

SEP 12, 1990
QC60760

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

TCLP – Semivolatile Compounds – GC/MS ANALYSIS (QRA5)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
FB1987	AMERADA HESS	AHCPTRDPRW	XPRW-COMP	900627		0

Compound	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
	Sample Concen ug/l	MDL ug/l	First ug/l	Second ug/l	Blank Data ug/l	Concen Added ug/l	% Recov	Unspiked Sample ug/l	Concen Added ug/l	% Recov
Pyridine	ND	11	ND	ND	ND	0	-	ND	0	-
1,4-Dichlorobenzene	ND	4.9	70.5	81.6	ND	100	66	ND	122	58
Hexachloroethane	ND	1.8	72.2	81.4	ND	100	60	ND	122	59
o-Cresol	ND	11	122	119	ND	200	62	ND	244	50
m+p-Cresols	BMDL	11	121	113	ND	200	61	ND	244	49
Nitrobenzene	ND	2.1	88.4	104	ND	100	84	ND	122	72
Hexachlorobutadiene	ND	1.0	86.7	102	ND	100	70	ND	122	71
2,4,6-Trichlorophenol	ND	3.0	151	117	ND	200	13	ND	244	62
2,4,5-Trichlorophenol	ND	11	139	114	ND	200	22	ND	244	57
2,4-Dinitrotoluene	ND	6.3	124	121	ND	100	92	ND	122	102
Hexachlorobenzene	ND	2.1	139	124	ND	100	101	ND	122	114
Pentachlorophenol	ND	4.0	135	109	ND	200	0	ND	244	55

ETC

SEP 18, 1990
QG60757

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

TCLP Pesticide Compounds - GC Analysis (QR67)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
FB1987	AMERADA HESS	AHCPTRDPRW	XPRW-COMP	900627		0

Compound	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
	Sample Concen, ug/l	MDL ug/l	First ug/l	Second ug/l	Blank Data ug/l	Concen Added ug/l	% Recov	Unspiked Sample ug/l	Concen Added ug/l	% Recov
Chlordane	ND	52	ND	ND	ND	0	-	ND	0	-
Endrin	ND	5.2	.511	.454	ND	2.00	83	ND	.658	78
Heptachlor	ND	2.6	.189	.194	ND	1.00	81	ND	.263	72
Heptachlor epoxide	ND	2.6	ND	ND	ND	1.00	87	ND	0	-
Lindane	ND	2.6	.209	.211	ND	1.00	95	ND	.263	80
Methoxychlor	ND	26	ND	ND	ND	10.0	92	ND	0	-
Toxaphene	ND	100	ND	ND	ND	0	-	ND	0	-

All zero and variable recoveries have been manually verified.

SEP 13, 1990
M60312

TABLE 1: QUANTITATIVE RESULTS

Metals – Analysis Data (QR52)

Chain of Custody Data Required for ETC Data Management Summary Reports						
ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
FB1987	AMERADA HESS	AHCPTRDPRW	XPRW-COMP	900627		0

Compound	Results: Sample Concen. ug/l	Results: MDL ug/l								
Arsenic	BMDL	100								
Barium	BMDL	500								
Cadmium	ND	2.0								
Chromium	670	10								
Lead	ND	75								
Mercury	ND	.20								
Selenium	BMDL	100								
Silver	BMDL	10								

ETC

SEP 17, 1990
QG60755

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

TCLP Herbicide Compounds – GC Analysis (QR70)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
FB1987	AMERADA HESS	AHCPTRDPRW	XPRW-COMP	900627		0

Compound	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
	Sample Concen. ug/l	MDL ug/l	First ug/l	Second ug/l	Blank Data ug/l	Concen. Added ug/l	% Recov	Unspiked Sample ug/l	Concen. Added ug/l	% Recov
2,4-D	ND	3.5	37.0	35.6	ND	50.0	95	5.69	50.0	63
2,4,5-TP (Silvex)	ND	.71	6.65	6.51	ND	10.0	95	ND	10.0	67

All zero and variable recoveries have been manually verified.

ETC

SEP 17 1990
QG60755

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

TCLP Herbicide Compounds – GC Analysis (QR70)

Chain of Custody Data Required for ETC Data Management Summary Reports						
FB1987	AMERADA HESS	AHCPTRDPRW	XPRW-COMP	900627		0
ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours

Compound	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
	Sample Concen. ug/l	MDL ug/l	* First ug/l	Second ug/l	Blank Data ug/l	Concen. Added ug/l	% Recov	Unspiked Sample ug/l	Concen. Added ug/l	% Recov
2,4-D	ND	3.5	37.0	35.6	ND	50.0	95	5.69	50.0	63
2,4,5-TP (Silvex)	ND	.71	6.65	6.51	ND	10.0	95	ND	10.0	67

All zero and variable recoveries have been manually verified.

APPENDIX IX

Status Report for Closure of the Aeration Basins (June 1988)

STATUS REPORT

FOR THE

CLOSURE OF THE

AERATION BASINS

AT THE

AMERADA HESS

(PORT READING) CORPORATION

REFINING FACILITY

JUNE 1988

GMS & ASSOCIATES

11271 RICHMOND, BLDG. II, SUITE 104, HOUSTON, TEXAS 77082-2617

1.0 INTRODUCTION

The Amerada Hess (Port Reading) Corporation refining facility operates an interim status Resource Conservation and Recovery Act (RCRA) land treatment unit, a landfarm system. Operation of the landfarm system requires attainment of two permits:

1) a RCRA Part B Operating Permit, and
2) a Hazardous and Solid Waste Amendments of 1984 (HSWA) Permit for Solid Waste Management Units (SWMUs) on-site.

The RCRA Part B permitting process is under the administration of the New Jersey Department of Environmental Protection (NJDEP), which has been granted authority to implement those parts of RCRA subsequent to the 1984 Amendments. The HSWA permitting process is administered by the U. S. Environmental Protection Agency (EPA). The HSWA Permit was issued by EPA on 31 March 1988 based on information provided by Amerada Hess (Port Reading) Corporation. This report addresses the Aeration Basins Closure, used for treatment of non-hazardous wastewater. Amerada Hess (Port Reading) Corporation has developed a substantial data base regarding this facility. Therefore, the Port Reading HSWA permit only required quarterly status reports regarding the Closure Project, and the EPA did not request any additional site investigation.

1.1 Aeration Basins Background

Amerada Hess (Port Reading) Corporation previously utilized three non-hazardous surface impoundments for the final treatment of the refinery wastewater. When the refining facility modernized its on-site wastewater treatment plant the three adjoining aeration basins were no longer needed and as such, the NJDEP required Amerada Hess (Port Reading) Corporation to submit a closure plan under their Discharge to Groundwater (DGW) permit system. Amerada Hess submitted a closure plan which was subsequently approved by the NJDEP in the refining facility's NJPDES-DGW permit for the refining facility.

1.2 HSWA Permit for the Aeration Basins

Amerada Hess (Port Reading) Corporation has compiled this report to provide the first quarterly report required under the HSWA permit, and also to provide a background base of this project. Included in the following report are;

1) the NJDEP approved closure plan,
2) photographs of the completed closure of the largest of the three basins,
3) pertinent correspondence between Amerada Hess and the NJDEP regarding this project, and
4) the as-built engineering drawings of the underdrain system in the largest basin.

2.0 REPORT CONTENTS

The overall plan for closing the Aeration Basins is to remove soils accumulated by refining facility wastewater operations from the present site for application on the expanded landfarm within the refining facility. Various miscellaneous procedures can be applied to the closure operations. Those which are currently anticipated include: stormwater management, equipment cleaning, safety and closure certification. The approved Closure Plan prepared by GMS & Associates is provided in Attachment No. 1 of this report.

2.1.1 Current Closure Status - the current closure status of the Aeration Basins is summarized as follows:

1) Approximately 1,000 cubic yards of sediments and detritus from the largest of the three basins have been moved to the No. 1 Landfarm. The large basin is approximately 2 acres; the total area of all three basins is approximately 4 acres.

2) The underlying soils at the large basin have been tested and have shown to meet decontamination objectives under the NJDEP permit. Pertinent correspondence is provided in Attachment No. 2. Additionally, photographs of the large basin closure are presented in Attachment No. 3.

3) Amerada Hess (Port Reading) Corporation has estimated that the removal of an additional 1,500 cubic yards of detritus from the remaining two basins may be necessary to achieve permit closure objectives. However, GMS and Associates recommends that the remaining detritus removal be delayed until the summer of 1989 to allow additional degradation of the detritus already placed in the No. 1 Landfarm.

4) Amerada Hess has installed an underdrain system within the large basin to collect groundwater. This system is operable; however, Amerada Hess has implemented an improvement on the pumping system for the collection boxes. The as-built engineering drawings are provided in Attachment No. 4.

It should be noted that the groundwater elevation is higher than the aeration basin bottom elevation. As a result, the groundwater flow is into the aeration basins. The underdrain system is designed to collect and remove groundwater to the Advanced Wastewater Treatment System. Therefore, the groundwater flow will always be into the basins where it is removed for treatment.

3.0 CONCLUSIONS

Amerada Hess (Port Reading) Corporation believes that the final closure of the remaining two aeration basins can be completed during the summer of 1989.

Amerada Hess (Port Reading) Corporation believes this summary report provides and complies with the status report requirements under the HSWA permit for the refinery. Further, Amerada Hess (Port Reading) Corporation recommends that subsequent quarterly reporting of the closure status of the Aeration Basin closure follow Section 2.1.1 of this report with the inclusion of final modifications made to the underdrain system.

APPENDIX X

Historic Detritus Analytical Results

New Jersey
ACCUTEST
LABORATORIES

06/27/11

Technical Report for

EnviroTrac, Ltd.

Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ

Aeration Basin

Accutest Job Number: JA74027

Sampling Date: 04/25/11

Report to:

EnviroTrac, Ltd

phila@envirotrac.com

ATTN: Phil Allegro

Total number of pages in report: **60**

ACCREDITED IN ACCORDANCE WITH nelac

Test results contained within this data package meet the requirements of the National Environmental Laboratory Accreditation Conference and/or state specific certification programs as applicable.

David N. Speis
VP, Laboratory Director

Client Service contact: Matt Cordova 732-329-0200

Certifications: NJ(12129), NY(10983), CA, CT, DE, FL, IL, IN, KS, KY, LA, MA, MD, MI, MT, NC, PA, RI, SC, TN, VA, WV

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Sample Summary

EnviroTrac, Ltd.

Job No: JA74027

Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ
Project No: Aeration Basin

Sample Number	Collected Date	Time By	Received	Matrix Code	Type	Client Sample ID
JA74027-1	04/25/11	10:50 KM	04/25/11	SO	Soil	SS-1
JA74027-2	04/25/11	10:52 KM	04/25/11	SO	Soil	SS-2
JA74027-3	04/25/11	10:55 KM	04/25/11	SO	Soil	SS-3
JA74027-4	04/25/11	10:57 KM	04/25/11	SO	Soil	SS-4
JA74027-5	04/25/11	11:00 KM	04/25/11	SO	Soil	SS-5
JA74027-6	04/25/11	11:02 KM	04/25/11	SO	Soil	SS-6
JA74027-7	04/25/11	11:05 KM	04/25/11	SO	Soil	SS-7
JA74027-8	04/25/11	11:07 KM	04/25/11	SO	Soil	SS-8
JA74027-9	04/25/11	11:10 KM	04/25/11	SO	Soil	SS-9
JA74027-10	04/25/11	11:13 KM	04/25/11	SO	Soil	SS-10
JA74027-11	04/25/11	11:15 KM	04/25/11	SO	Soil	SS-11
JA74027-12	04/25/11	11:18 KM	04/25/11	SO	Soil	SS-12
JA74027-13	04/25/11	11:21 KM	04/25/11	SO	Soil	SS-13

Soil samples reported on a dry weight basis unless otherwise indicated on result page.

Sample Summary

(continued)

EnviroTrac, Ltd.

Job No: JA74027

Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ
Project No: Aeration Basin

Sample Number	Collected Date	Time By	Received	Matrix Code	Type	Client Sample ID
JA74027-14	04/25/11	11:27 KM	04/25/11	SO	Soil	SS-14
JA74027-15	04/25/11	11:32 KM	04/25/11	SO	Soil	SS-15
JA74027-16	04/25/11	11:37 KM	04/25/11	SO	Soil	SS-16
JA74027-17	04/25/11	11:42 KM	04/25/11	SO	Soil	SS-17
JA74027-18	04/25/11	11:46 KM	04/25/11	SO	Soil	SS-18
JA74027-19	04/25/11	11:50 KM	04/25/11	SO	Soil	SS-19
JA74027-20	04/25/11	11:54 KM	04/25/11	SO	Soil	SS-20
JA74027-21	04/25/11	11:59 KM	04/25/11	SO	Soil	SS-21
JA74027-22	04/25/11	10:53 KM	04/25/11	SO	Soil	SS-22
JA74027-23	04/25/11	10:55 KM	04/25/11	SO	Soil	SS-23
JA74027-24	04/25/11	10:58 KM	04/25/11	SO	Soil	SS-24
JA74027-25	04/25/11	11:00 KM	04/25/11	SO	Soil	SS-25
JA74027-26	04/25/11	11:02 KM	04/25/11	SO	Soil	SS-26

Soil samples reported on a dry weight basis unless otherwise indicated on result page.

Sample Summary
(continued)

EnviroTrac, Ltd.

Job No: JA74027

Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ
Project No: Aeration Basin

Sample Number	Collected Date	Time By	Received	Matrix Code	Type	Client Sample ID
JA74027-27	04/25/11	11:06 KM	04/25/11	SO	Soil	SS-27
JA74027-28	04/25/11	11:08 KM	04/25/11	SO	Soil	SS-28
JA74027-29	04/25/11	11:12 KM	04/25/11	SO	Soil	SS-29
JA74027-30	04/25/11	11:15 KM	04/25/11	SO	Soil	SS-30
JA74027-31	04/25/11	11:18 KM	04/25/11	SO	Soil	SS-31
JA74027-32	04/25/11	11:21 KM	04/25/11	SO	Soil	SS-32
JA74027-33	04/25/11	11:25 KM	04/25/11	SO	Soil	SS-33
JA74027-34	04/25/11	11:28 KM	04/25/11	SO	Soil	SS-34
JA74027-35	04/25/11	11:32 KM	04/25/11	SO	Soil	SS-35
JA74027-36	04/25/11	11:36 KM	04/25/11	SO	Soil	SS-36
JA74027-37	04/25/11	11:39 KM	04/25/11	SO	Soil	SS-37
JA74027-38	04/25/11	11:41 KM	04/25/11	SO	Soil	SS-38
JA74027-39	04/25/11	11:44 KM	04/25/11	SO	Soil	SS-39

Soil samples reported on a dry weight basis unless otherwise indicated on result page.

Sample Summary

(continued)

EnviroTrac, Ltd.

Job No: JA74027

Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ
Project No: Aeration Basin

Sample Number	Collected Date	Time By	Received	Matrix Code	Type	Client Sample ID
JA74027-40	04/25/11	11:48 KM	04/25/11	SO	Soil	SS-40
JA74027-41	04/25/11	11:52 KM	04/25/11	SO	Soil	SS-41
JA74027-42	04/25/11	11:56 KM	04/25/11	SO	Soil	SS-42
JA74027-43	04/25/11	11:59 KM	04/25/11	SO	Soil	SS-43
JA74027-44	04/25/11	12:03 KM	04/25/11	SO	Soil	SS-44

Soil samples reported on a dry weight basis unless otherwise indicated on result page.

CASE NARRATIVE / CONFORMANCE SUMMARY

Client: EnviroTrac, Ltd. **Job No** JA74027

Site: Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ **Report Date** 5/21/2011 4:27:31 PM

On 04/25/2011, 44 Sample(s), 0 Trip Blank(s) and 0 Field Blank(s) were received at Accutest Laboratories at a temperature of 22 C. Samples were intact and properly preserved, unless noted below. An Accutest Job Number of JA74027 was assigned to the project. Laboratory sample ID, client sample ID and dates of sample collection are detailed in the report's Results Summary Section. (The sample was directly received from field sampling and ok to run per client.)

Specified quality control criteria were achieved for this job except as noted below. For more information, please refer to the analytical results and QC summary pages.

Extractables by GC By Method NJDEP EPH

Matrix: SO **Batch ID:** OP49365

- All samples were extracted within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JA74020-1MS, JA74020-1MSD, JA74020-2DUP were used as the QC samples indicated.
- Matrix Spike / Matrix Spike Duplicate Recovery(s) for EPH (C9-C28), Total EPH (C9-C40) are outside control limits. Outside control limits due to high level in sample relative to spike amount.
- JA74027-42 for 1-Chlorooctadecane: Outside control limits due to matrix interference.

Matrix: SO **Batch ID:** OP49389

- All samples were extracted within the recommended method holding time.
- Sample(s) JA74027-1MS, JA74027-1MSD, JA74027-2DUP were used as the QC samples indicated.
- All method blanks for this batch meet method specific criteria.
- Matrix Spike / Matrix Spike Duplicate Recovery(s) for EPH (>C28-C40), EPH (C9-C28), Total EPH (C9-C40) are outside control limits. Outside control limits due to high level in sample relative to spike amount.
- RPD(s) for Duplicate for EPH (>C28-C40), Total EPH (C9-C40) are outside control limits for sample OP49389-DUP. Outside control limits due to matrix interference.
- OP49389-MS for o-Terphenyl: Outside control limits due to matrix interference.
- OP49389-MSD for o-Terphenyl: Outside control limits due to matrix interference.

Matrix: SO **Batch ID:** OP49390

- All samples were extracted within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JA74027-34DUP, JA74027-35MS, JA74027-35MSD, JA74027-34DUP were used as the QC samples indicated.
- Matrix Spike / Matrix Spike Duplicate Recovery(s) for EPH (>C28-C40), EPH (C9-C28), Total EPH (C9-C40) are outside control limits. Outside control limits due to high level in sample relative to spike amount.
- RPD(s) for Duplicate for EPH (>C28-C40), EPH (C9-C28), Total EPH (C9-C40) are outside control limits for sample OP49390-DUP. Outside control limits due to matrix interference.
- JA74027-40 for 1-Chlorooctadecane: Outside control limits due to matrix interference.
- JA74027-22 for 1-Chlorooctadecane: Outside control limits due to matrix interference.

2

Wet Chemistry By Method SM18 2540G

Matrix: SO	**Batch ID:** GN50512

- The data for SM18 2540G meets quality control requirements.

Matrix: SO	**Batch ID:** GN50513

- The data for SM18 2540G meets quality control requirements.

Matrix: SO	**Batch ID:** GN50525

- The data for SM18 2540G meets quality control requirements.

Matrix: SO	**Batch ID:** GN50533

- The data for SM18 2540G meets quality control requirements.

Accutest certifies that data reported for samples received, listed on the associated custody chain or analytical task order, were produced to specifications meeting Accutest's Quality System precision, accuracy and completeness objectives except as noted.

Estimated non-standard method measurement uncertainty data is available on request, based on quality control bias and implicit for standard methods. Acceptable uncertainty requires tested parameter quality control data to meet method criteria.

Accutest Laboratories is not responsible for data quality assumptions if partial reports are used and recommends that this report be used in its entirety. Data release is authorized by Accutest Laboratories indicated via signature on the report cover

New Jersey
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LABORATORIES

Sample Results

Report of Analysis

Report of Analysis

Client Sample ID:	SS-1		
Lab Sample ID:	JA74027-1	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	NJDEP EPH SW846 3545	**Percent Solids:**	74.8
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	4Z3676.D	20	04/28/11	DNM	04/27/11	OP49389	G4Z121
Run #2							

	Initial Weight	Final Volume
Run #1	17.0 g	2.0 ml
Run #2		

NJDEP EPH List

CAS No.	Compound	Result	RL	Units	Q
	EPH (C9-C28)	26200	130	mg/kg	
	EPH (> C28-C40)	3960	130	mg/kg	
	Total EPH (C9-C40)	30100	130	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	96%		40-140%
3386-33-2	1-Chlorooctadecane	71%		40-140%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS-2		
Lab Sample ID:	JA74027-2	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	NJDEP EPH SW846 3545	**Percent Solids:**	76.0
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	4Z3677.D	20	04/29/11	DNM	04/27/11	OP49389	G4Z121
Run #2							

	Initial Weight	Final Volume
Run #1	17.0 g	2.0 ml
Run #2		

NJDEP EPH List

CAS No.	Compound	Result	RL	Units	Q
	EPH (C9-C28)	11400	120	mg/kg	
	EPH (> C28-C40)	2240	120	mg/kg	
	Total EPH (C9-C40)	13600	120	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	82%		40-140%
3386-33-2	1-Chlorooctadecane	111%		40-140%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS-3		
Lab Sample ID:	JA74027-3	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	NJDEP EPH SW846 3545	**Percent Solids:**	74.9
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	4Z3678.D	20	04/29/11	DNM	04/27/11	OP49389	G4Z121
Run #2							

	Initial Weight	Final Volume
Run #1	17.0 g	2.0 ml
Run #2		

NJDEP EPH List

CAS No.	Compound	Result	RL	Units	Q
	EPH (C9-C28)	10400	130	mg/kg	
	EPH (> C28-C40)	2220	130	mg/kg	
	Total EPH (C9-C40)	12600	130	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	90%		40-140%
3386-33-2	1-Chlorooctadecane	104%		40-140%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS-4		
Lab Sample ID:	JA74027-4	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	NJDEP EPH SW846 3545	**Percent Solids:**	81.7
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	4Z3637.D	1	04/27/11	OPM	04/27/11	OP49389	G4Z120
Run #2							

	Initial Weight	Final Volume
Run #1	17.0 g	2.0 ml
Run #2		

NJDEP EPH List

CAS No.	Compound	Result	RL	Units	Q
	EPH (C9-C28)	2010	5.8	mg/kg	
	EPH (> C28-C40)	230	5.8	mg/kg	
	Total EPH (C9-C40)	2240	5.8	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	83%		40-140%
3386-33-2	1-Chlorooctadecane	62%		40-140%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS-5		
Lab Sample ID:	JA74027-5	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	NJDEP EPH SW846 3545	**Percent Solids:**	73.9
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	4Z3679.D	10	04/29/11	DNM	04/27/11	OP49389	G4Z121
Run #2							

	Initial Weight	Final Volume
Run #1	17.0 g	2.0 ml
Run #2		

NJDEP EPH List

CAS No.	Compound	Result	RL	Units	Q
	EPH (C9-C28)	6340	64	mg/kg	
	EPH (> C28-C40)	1580	64	mg/kg	
	Total EPH (C9-C40)	7920	64	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	82%		40-140%
3386-33-2	1-Chlorooctadecane	89%		40-140%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS-6		
Lab Sample ID:	JA74027-6	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	NJDEP EPH SW846 3545	**Percent Solids:**	73.9
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	4Z3680.D	10	04/29/11	DNM	04/27/11	OP49389	G4Z121
Run #2							

	Initial Weight	Final Volume
Run #1	17.0 g	2.0 ml
Run #2		

NJDEP EPH List

CAS No.	Compound	Result	RL	Units	Q
	EPH (C9-C28)	9570	64	mg/kg	
	EPH (> C28-C40)	2010	64	mg/kg	
	Total EPH (C9-C40)	11600	64	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	83%		40-140%
3386-33-2	1-Chlorooctadecane	77%		40-140%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS-7		
Lab Sample ID:	JA74027-7	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	NJDEP EPH SW846 3545	**Percent Solids:**	75.6
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	4Z3736.D	20	05/02/11	DNM	04/27/11	OP49389	G4Z123
Run #2							

	Initial Weight	Final Volume
Run #1	17.0 g	2.0 ml
Run #2		

NJDEP EPH List

CAS No.	Compound	Result	RL	Units	Q
	EPH (C9-C28)	12200	120	mg/kg	
	EPH (> C28-C40)	2660	120	mg/kg	
	Total EPH (C9-C40)	14800	120	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	78%		40-140%
3386-33-2	1-Chlorooctadecane	109%		40-140%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS-8		
Lab Sample ID:	JA74027-8	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	NJDEP EPH SW846 3545	**Percent Solids:**	75.9
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	4Z3750.D	10	05/03/11	DNM	04/27/11	OP49389	G4Z123
Run #2							

	Initial Weight	Final Volume
Run #1	17.0 g	2.0 ml
Run #2		

NJDEP EPH List

CAS No.	Compound	Result	RL	Units	Q
	EPH (C9-C28)	8530	62	mg/kg	
	EPH (> C28-C40)	2000	62	mg/kg	
	Total EPH (C9-C40)	10500	62	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	91%		40-140%
3386-33-2	1-Chlorooctadecane	109%		40-140%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS-9		
Lab Sample ID:	JA74027-9	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	NJDEP EPH SW846 3545	**Percent Solids:**	73.1
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	4Z3751.D	10	05/03/11	DNM	04/27/11	OP49389	G4Z123
Run #2							

	Initial Weight	Final Volume
Run #1	17.0 g	2.0 ml
Run #2		

NJDEP EPH List

CAS No.	Compound	Result	RL	Units	Q
	EPH (C9-C28)	7870	64	mg/kg	
	EPH (> C28-C40)	1960	64	mg/kg	
	Total EPH (C9-C40)	9820	64	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	80%		40-140%
3386-33-2	1-Chlorooctadecane	101%		40-140%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS-10		
Lab Sample ID:	JA74027-10	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	NJDEP EPH SW846 3545	**Percent Solids:**	77.5
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	4Z3752.D	10	05/03/11	DNM	04/27/11	OP49389	G4Z123
Run #2							

	Initial Weight	Final Volume
Run #1	17.0 g	2.0 ml
Run #2		

NJDEP EPH List

CAS No.	Compound	Result	RL	Units	Q
	EPH (C9-C28)	9180	61	mg/kg	
	EPH (> C28-C40)	1900	61	mg/kg	
	Total EPH (C9-C40)	11100	61	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	89%		40-140%
3386-33-2	1-Chlorooctadecane	110%		40-140%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS-11		
Lab Sample ID:	JA74027-11	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	NJDEP EPH SW846 3545	**Percent Solids:**	74.7
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	4Z3663.D	1	04/28/11	DNM	04/27/11	OP49389	G4Z121
Run #2							

	Initial Weight	Final Volume
Run #1	17.0 g	2.0 ml
Run #2		

NJDEP EPH List

CAS No.	Compound	Result	RL	Units	Q
	EPH (C9-C28)	2140	6.3	mg/kg	
	EPH (> C28-C40)	512	6.3	mg/kg	
	Total EPH (C9-C40)	2650	6.3	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	85%		40-140%
3386-33-2	1-Chlorooctadecane	76%		40-140%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS-12		
Lab Sample ID:	JA74027-12	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	NJDEP EPH SW846 3545	**Percent Solids:**	75.2
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	4Z3753.D	20	05/03/11	DNM	04/27/11	OP49389	G4Z123
Run #2							

	Initial Weight	Final Volume
Run #1	17.0 g	2.0 ml
Run #2		

NJDEP EPH List

CAS No.	Compound	Result	RL	Units	Q
	EPH (C9-C28)	18300	130	mg/kg	
	EPH (> C28-C40)	3300	130	mg/kg	
	Total EPH (C9-C40)	21600	130	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	94%		40-140%
3386-33-2	1-Chlorooctadecane	122%		40-140%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS-13		
Lab Sample ID:	JA74027-13	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	NJDEP EPH SW846 3545	**Percent Solids:**	77.4
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	4Z3754.D	10	05/03/11	DNM	04/27/11	OP49389	G4Z123
Run #2							

	Initial Weight	Final Volume
Run #1	17.0 g	2.0 ml
Run #2		

NJDEP EPH List

CAS No.	Compound	Result	RL	Units	Q
	EPH (C9-C28)	8200	61	mg/kg	
	EPH (> C28-C40)	1940	61	mg/kg	
	Total EPH (C9-C40)	10100	61	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	78%		40-140%
3386-33-2	1-Chlorooctadecane	95%		40-140%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS-14		
Lab Sample ID:	JA74027-14	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	NJDEP EPH SW846 3545	**Percent Solids:**	78.1
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	4Z3755.D	20	05/03/11	DNM	04/27/11	OP49389	G4Z123
Run #2							

	Initial Weight	Final Volume
Run #1	17.0 g	2.0 ml
Run #2		

NJDEP EPH List

CAS No.	Compound	Result	RL	Units	Q
	EPH (C9-C28)	11400	120	mg/kg	
	EPH (> C28-C40)	2280	120	mg/kg	
	Total EPH (C9-C40)	13700	120	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	91%		40-140%
3386-33-2	1-Chlorooctadecane	118%		40-140%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS-15		
Lab Sample ID:	JA74027-15	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	NJDEP EPH SW846 3545	**Percent Solids:**	74.9
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	4Z3756.D	20	05/03/11	DNM	04/27/11	OP49389	G4Z123
Run #2							

	Initial Weight	Final Volume
Run #1	17.0 g	2.0 ml
Run #2		

NJDEP EPH List

CAS No.	Compound	Result	RL	Units	Q
	EPH (C9-C28)	8410	130	mg/kg	
	EPH (> C28-C40)	1900	130	mg/kg	
	Total EPH (C9-C40)	10300	130	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	82%		40-140%
3386-33-2	1-Chlorooctadecane	98%		40-140%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS-16		
Lab Sample ID:	JA74027-16	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	NJDEP EPH SW846 3545	**Percent Solids:**	78.6
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	4Z3757.D	5	05/03/11	DNM	04/27/11	OP49389	G4Z123
Run #2							

	Initial Weight	Final Volume
Run #1	17.0 g	2.0 ml
Run #2		

NJDEP EPH List

CAS No.	Compound	Result	RL	Units	Q
	EPH (C9-C28)	4090	30	mg/kg	
	EPH (> C28-C40)	1020	30	mg/kg	
	Total EPH (C9-C40)	5120	30	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	90%		40-140%
3386-33-2	1-Chlorooctadecane	94%		40-140%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS-17		
Lab Sample ID:	JA74027-17	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	NJDEP EPH SW846 3545	**Percent Solids:**	78.1
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	4Z3758.D	20	05/03/11	DNM	04/27/11	OP49389	G4Z123
Run #2							

	Initial Weight	Final Volume
Run #1	17.0 g	2.0 ml
Run #2		

NJDEP EPH List

CAS No.	Compound	Result	RL	Units	Q
	EPH (C9-C28)	10800	120	mg/kg	
	EPH (> C28-C40)	2010	120	mg/kg	
	Total EPH (C9-C40)	12800	120	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	76%		40-140%
3386-33-2	1-Chlorooctadecane	100%		40-140%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS-18		
Lab Sample ID:	JA74027-18	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	NJDEP EPH SW846 3545	**Percent Solids:**	75.0
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	4Z3759.D	20	05/03/11	DNM	04/27/11	OP49389	G4Z123
Run #2							

	Initial Weight	Final Volume
Run #1	17.0 g	2.0 ml
Run #2		

NJDEP EPH List

CAS No.	Compound	Result	RL	Units	Q
	EPH (C9-C28)	12000	130	mg/kg	
	EPH (> C28-C40)	2180	130	mg/kg	
	Total EPH (C9-C40)	14200	130	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	75%		40-140%
3386-33-2	1-Chlorooctadecane	97%		40-140%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS-19		
Lab Sample ID:	JA74027-19	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	NJDEP EPH SW846 3545	**Percent Solids:**	78.2
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	4Z3687.D	1	04/29/11	DNM	04/27/11	OP49389	G4Z121
Run #2							

	Initial Weight	Final Volume
Run #1	17.0 g	2.0 ml
Run #2		

NJDEP EPH List

CAS No.	Compound	Result	RL	Units	Q
	EPH (C9-C28)	2560	6.0	mg/kg	
	EPH (> C28-C40)	479	6.0	mg/kg	
	Total EPH (C9-C40)	3040	6.0	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	78%		40-140%
3386-33-2	1-Chlorooctadecane	73%		40-140%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS-20		
Lab Sample ID:	JA74027-20	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	NJDEP EPH SW846 3545	**Percent Solids:**	76.0
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	4Z3760.D	20	05/03/11	DNM	04/27/11	OP49389	G4Z123
Run #2							

	Initial Weight	Final Volume
Run #1	17.0 g	2.0 ml
Run #2		

NJDEP EPH List

CAS No.	Compound	Result	RL	Units	Q
	EPH (C9-C28)	15700	120	mg/kg	
	EPH (> C28-C40)	2880	120	mg/kg	
	Total EPH (C9-C40)	18600	120	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	94%		40-140%
3386-33-2	1-Chlorooctadecane	133%		40-140%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS-21		
Lab Sample ID:	JA74027-21	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	NJDEP EPH SW846 3545	**Percent Solids:**	76.4
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	4Y4584.D	20	04/29/11	DNM	04/27/11	OP49390	G4Y153
Run #2							

	Initial Weight	Final Volume
Run #1	17.0 g	2.0 ml
Run #2		

NJDEP EPH List

CAS No.	Compound	Result	RL	Units	Q
	EPH (C9-C28)	11600	120	mg/kg	
	EPH (> C28-C40)	2780	120	mg/kg	
	Total EPH (C9-C40)	14300	120	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	100%		40-140%
3386-33-2	1-Chlorooctadecane	118%		40-140%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS-22		
Lab Sample ID:	JA74027-22	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	NJDEP EPH SW846 3545	**Percent Solids:**	75.0
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	4Y4585.D	20	04/29/11	DNM	04/27/11	OP49390	G4Y153
Run #2							

	Initial Weight	Final Volume
Run #1	17.0 g	2.0 ml
Run #2		

NJDEP EPH List

CAS No.	Compound	Result	RL	Units	Q
	EPH (C9-C28)	21300	130	mg/kg	
	EPH (> C28-C40)	3910	130	mg/kg	
	Total EPH (C9-C40)	25200	130	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	116%		40-140%
3386-33-2	1-Chlorooctadecane	154% [a]		40-140%

(a) Outside control limits due to matrix interference.

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS-23		
Lab Sample ID:	JA74027-23	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	NJDEP EPH SW846 3545	**Percent Solids:**	76.3
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	4Y4586.D	20	04/29/11	DNM	04/27/11	OP49390	G4Y153
Run #2							

	Initial Weight	Final Volume
Run #1	17.0 g	2.0 ml
Run #2		

NJDEP EPH List

CAS No.	Compound	Result	RL	Units	Q
	EPH (C9-C28)	9480	120	mg/kg	
	EPH (> C28-C40)	2360	120	mg/kg	
	Total EPH (C9-C40)	11800	120	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	103%		40-140%
3386-33-2	1-Chlorooctadecane	112%		40-140%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS-24		
Lab Sample ID:	JA74027-24	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	NJDEP EPH SW846 3545	**Percent Solids:**	74.7
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	4Y4587.D	20	04/29/11	DNM	04/27/11	OP49390	G4Y153
Run #2							

	Initial Weight	Final Volume
Run #1	17.0 g	2.0 ml
Run #2		

NJDEP EPH List

CAS No.	Compound	Result	RL	Units	Q
	EPH (C9-C28)	10400	130	mg/kg	
	EPH (> C28-C40)	2190	130	mg/kg	
	Total EPH (C9-C40)	12600	130	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	107%		40-140%
3386-33-2	1-Chlorooctadecane	127%		40-140%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS-25		
Lab Sample ID:	JA74027-25	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	NJDEP EPH SW846 3545	**Percent Solids:**	75.4
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	4Y4588.D	20	04/29/11	DNM	04/27/11	OP49390	G4Y153
Run #2							

	Initial Weight	Final Volume
Run #1	17.0 g	2.0 ml
Run #2		

NJDEP EPH List

CAS No.	Compound	Result	RL	Units	Q
	EPH (C9-C28)	10300	120	mg/kg	
	EPH (> C28-C40)	2210	120	mg/kg	
	Total EPH (C9-C40)	12500	120	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	100%		40-140%
3386-33-2	1-Chlorooctadecane	95%		40-140%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS-26		
Lab Sample ID:	JA74027-26	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	NJDEP EPH SW846 3545	**Percent Solids:**	75.3
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	4Y4589.D	20	04/29/11	DNM	04/27/11	OP49390	G4Y153
Run #2							

	Initial Weight	Final Volume
Run #1	17.0 g	2.0 ml
Run #2		

NJDEP EPH List

CAS No.	Compound	Result	RL	Units	Q
	EPH (C9-C28)	14800	120	mg/kg	
	EPH (> C28-C40)	3100	120	mg/kg	
	Total EPH (C9-C40)	17900	120	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	106%		40-140%
3386-33-2	1-Chlorooctadecane	122%		40-140%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS-27		
Lab Sample ID:	JA74027-27	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	NJDEP EPH SW846 3545	**Percent Solids:**	76.6
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	4Y4590.D	20	04/29/11	DNM	04/27/11	OP49390	G4Y153
Run #2							

	Initial Weight	Final Volume
Run #1	17.0 g	2.0 ml
Run #2		

NJDEP EPH List

CAS No.	Compound	Result	RL	Units	Q
	EPH (C9-C28)	6030	120	mg/kg	
	EPH (> C28-C40)	1640	120	mg/kg	
	Total EPH (C9-C40)	7660	120	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	115%		40-140%
3386-33-2	1-Chlorooctadecane	98%		40-140%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS-28		
Lab Sample ID:	JA74027-28	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	NJDEP EPH SW846 3545	**Percent Solids:**	78.6
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	4Y4733.D	20	05/06/11	DNM	04/27/11	OP49390	G4Y158
Run #2							

	Initial Weight	Final Volume
Run #1	17.0 g	2.0 ml
Run #2		

NJDEP EPH List

CAS No.	Compound	Result	RL	Units	Q
	EPH (C9-C28)	11200	120	mg/kg	
	EPH (> C28-C40)	2410	120	mg/kg	
	Total EPH (C9-C40)	13600	120	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	91%		40-140%
3386-33-2	1-Chlorooctadecane	112%		40-140%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS-29		
Lab Sample ID:	JA74027-29	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	NJDEP EPH SW846 3545	**Percent Solids:**	76.3
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	4Y4591.D	20	04/29/11	DNM	04/27/11	OP49390	G4Y153
Run #2							

	Initial Weight	Final Volume
Run #1	17.0 g	2.0 ml
Run #2		

NJDEP EPH List

CAS No.	Compound	Result	RL	Units	Q
	EPH (C9-C28)	25200	120	mg/kg	
	EPH (> C28-C40)	4980	120	mg/kg	
	Total EPH (C9-C40)	30100	120	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	102%		40-140%
3386-33-2	1-Chlorooctadecane	132%		40-140%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS-30		
Lab Sample ID:	JA74027-30	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	NJDEP EPH SW846 3545	**Percent Solids:**	76.6
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	4Y4592.D	20	04/29/11	DNM	04/27/11	OP49390	G4Y153
Run #2							

	Initial Weight	Final Volume
Run #1	17.0 g	2.0 ml
Run #2		

NJDEP EPH List

CAS No.	Compound	Result	RL	Units	Q
	EPH (C9-C28)	17600	120	mg/kg	
	EPH (> C28-C40)	4320	120	mg/kg	
	Total EPH (C9-C40)	21900	120	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	98%		40-140%
3386-33-2	1-Chlorooctadecane	131%		40-140%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS-31		
Lab Sample ID:	JA74027-31	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	NJDEP EPH SW846 3545	**Percent Solids:**	76.0
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	4Y4593.D	20	04/29/11	DNM	04/27/11	OP49390	G4Y153
Run #2							

	Initial Weight	Final Volume
Run #1	17.0 g	2.0 ml
Run #2		

NJDEP EPH List

CAS No.	Compound	Result	RL	Units	Q
	EPH (C9-C28)	17100	120	mg/kg	
	EPH (> C28-C40)	4220	120	mg/kg	
	Total EPH (C9-C40)	21300	120	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	81%		40-140%
3386-33-2	1-Chlorooctadecane	119%		40-140%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS-32		
Lab Sample ID:	JA74027-32	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	NJDEP EPH SW846 3545	**Percent Solids:**	77.1
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	4Y4594.D	20	04/29/11	DNM	04/27/11	OP49390	G4Y153
Run #2							

	Initial Weight	Final Volume
Run #1	17.0 g	2.0 ml
Run #2		

NJDEP EPH List

CAS No.	Compound	Result	RL	Units	Q
	EPH (C9-C28)	13000	120	mg/kg	
	EPH (> C28-C40)	2870	120	mg/kg	
	Total EPH (C9-C40)	15900	120	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	84%		40-140%
3386-33-2	1-Chlorooctadecane	97%		40-140%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS-33		
Lab Sample ID:	JA74027-33	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	NJDEP EPH SW846 3545	**Percent Solids:**	77.0
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	4Y4595.D	20	04/30/11	DNM	04/27/11	OP49390	G4Y153
Run #2							

	Initial Weight	Final Volume
Run #1	17.0 g	2.0 ml
Run #2		

NJDEP EPH List

CAS No.	Compound	Result	RL	Units	Q
	EPH (C9-C28)	24000	120	mg/kg	
	EPH (> C28-C40)	3850	120	mg/kg	
	Total EPH (C9-C40)	27800	120	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	92%		40-140%
3386-33-2	1-Chlorooctadecane	128%		40-140%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS-34		
Lab Sample ID:	JA74027-34	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	NJDEP EPH SW846 3545	**Percent Solids:**	76.8
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	4Y4596.D	20	04/30/11	DNM	04/27/11	OP49390	G4Y153
Run #2							

	Initial Weight	Final Volume
Run #1	17.0 g	2.0 ml
Run #2		

NJDEP EPH List

CAS No.	Compound	Result	RL	Units	Q
	EPH (C9-C28)	28100	120	mg/kg	
	EPH (> C28-C40)	5430	120	mg/kg	
	Total EPH (C9-C40)	33600	120	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	95%		40-140%
3386-33-2	1-Chlorooctadecane	136%		40-140%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS-35		
Lab Sample ID:	JA74027-35	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	NJDEP EPH SW846 3545	**Percent Solids:**	78.7
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	4Y4597.D	20	04/30/11	DNM	04/27/11	OP49390	G4Y153
Run #2							

	Initial Weight	Final Volume
Run #1	17.0 g	2.0 ml
Run #2		

NJDEP EPH List

CAS No.	Compound	Result	RL	Units	Q
	EPH (C9-C28)	16800	120	mg/kg	
	EPH (> C28-C40)	3940	120	mg/kg	
	Total EPH (C9-C40)	20700	120	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	95%		40-140%
3386-33-2	1-Chlorooctadecane	114%		40-140%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS-36		
Lab Sample ID:	JA74027-36	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	NJDEP EPH SW846 3545	**Percent Solids:**	80.3
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	4Y4598.D	10	04/30/11	DNM	04/27/11	OP49390	G4Y153
Run #2							

	Initial Weight	Final Volume
Run #1	17.0 g	2.0 ml
Run #2		

NJDEP EPH List

CAS No.	Compound	Result	RL	Units	Q
	EPH (C9-C28)	5380	59	mg/kg	
	EPH (> C28-C40)	1620	59	mg/kg	
	Total EPH (C9-C40)	7000	59	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	97%		40-140%
3386-33-2	1-Chlorooctadecane	85%		40-140%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS-37		
Lab Sample ID:	JA74027-37	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	NJDEP EPH SW846 3545	**Percent Solids:**	75.1
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	4Y4599.D	20	04/30/11	DNM	04/27/11	OP49390	G4Y153
Run #2							

	Initial Weight	Final Volume
Run #1	17.0 g	2.0 ml
Run #2		

NJDEP EPH List

CAS No.	Compound	Result	RL	Units	Q
	EPH (C9-C28)	14400	130	mg/kg	
	EPH (> C28-C40)	3520	130	mg/kg	
	Total EPH (C9-C40)	17900	130	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	86%		40-140%
3386-33-2	1-Chlorooctadecane	115%		40-140%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS-38		
Lab Sample ID:	JA74027-38	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	NJDEP EPH SW846 3545	**Percent Solids:**	74.8
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	4Y4600.D	20	04/30/11	DNM	04/27/11	OP49390	G4Y153
Run #2							

	Initial Weight	Final Volume
Run #1	17.0 g	2.0 ml
Run #2		

NJDEP EPH List

CAS No.	Compound	Result	RL	Units	Q
	EPH (C9-C28)	21000	130	mg/kg	
	EPH (> C28-C40)	4170	130	mg/kg	
	Total EPH (C9-C40)	25200	130	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	107%		40-140%
3386-33-2	1-Chlorooctadecane	138%		40-140%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS-39		
Lab Sample ID:	JA74027-39	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	NJDEP EPH SW846 3545	**Percent Solids:**	79.2
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	4Y4601.D	20	04/30/11	DNM	04/27/11	OP49390	G4Y153
Run #2							

	Initial Weight	Final Volume
Run #1	17.0 g	2.0 ml
Run #2		

NJDEP EPH List

CAS No.	Compound	Result	RL	Units	Q
	EPH (C9-C28)	15000	120	mg/kg	
	EPH (> C28-C40)	3170	120	mg/kg	
	Total EPH (C9-C40)	18100	120	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	79%		40-140%
3386-33-2	1-Chlorooctadecane	108%		40-140%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS-40		
Lab Sample ID:	JA74027-40	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	NJDEP EPH SW846 3545	**Percent Solids:**	77.4
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	4Y4602.D	20	04/30/11	DNM	04/27/11	OP49390	G4Y153
Run #2							

	Initial Weight	Final Volume
Run #1	17.0 g	2.0 ml
Run #2		

NJDEP EPH List

CAS No.	Compound	Result	RL	Units	Q
	EPH (C9-C28)	27900	120	mg/kg	
	EPH (> C28-C40)	4650	120	mg/kg	
	Total EPH (C9-C40)	32500	120	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	71%		40-140%
3386-33-2	1-Chlorooctadecane	147% [a]		40-140%

(a) Outside control limits due to matrix interference.

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS-41		
Lab Sample ID:	JA74027-41	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	NJDEP EPH SW846 3545	**Percent Solids:**	80.2
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	4Y4555.D	20	04/28/11	DNM	04/26/11	OP49365	G4Y152
Run #2							

	Initial Weight	Final Volume
Run #1	17.0 g	2.0 ml
Run #2		

NJDEP EPH List

CAS No.	Compound	Result	RL	Units	Q
	EPH (C9-C28)	16900	120	mg/kg	
	EPH (> C28-C40)	3560	120	mg/kg	
	Total EPH (C9-C40)	20400	120	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	109%		40-140%
3386-33-2	1-Chlorooctadecane	131%		40-140%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS-42		
Lab Sample ID:	JA74027-42	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	NJDEP EPH SW846 3545	**Percent Solids:**	80.2
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	4Y4556.D	20	04/28/11	DNM	04/26/11	OP49365	G4Y152
Run #2							

	Initial Weight	Final Volume
Run #1	17.0 g	2.0 ml
Run #2		

NJDEP EPH List

CAS No.	Compound	Result	RL	Units	Q
	EPH (C9-C28)	26400	120	mg/kg	
	EPH (> C28-C40)	5250	120	mg/kg	
	Total EPH (C9-C40)	31700	120	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	92%		40-140%
3386-33-2	1-Chlorooctadecane	156% [a]		40-140%

(a) Outside control limits due to matrix interference.

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS-43		
Lab Sample ID:	JA74027-43	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	NJDEP EPH SW846 3545	**Percent Solids:**	77.8
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	4Y4557.D	10	04/28/11	DNM	04/26/11	OP49365	G4Y152
Run #2							

	Initial Weight	Final Volume
Run #1	17.0 g	2.0 ml
Run #2		

NJDEP EPH List

CAS No.	Compound	Result	RL	Units	Q
	EPH (C9-C28)	4860	60	mg/kg	
	EPH (> C28-C40)	1770	60	mg/kg	
	Total EPH (C9-C40)	6630	60	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	119%		40-140%
3386-33-2	1-Chlorooctadecane	95%		40-140%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS-44		
Lab Sample ID:	JA74027-44	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	NJDEP EPH SW846 3545	**Percent Solids:**	77.5
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	4Y4558.D	10	04/29/11	DNM	04/26/11	OP49365	G4Y152
Run #2							

	Initial Weight	Final Volume
Run #1	17.0 g	2.0 ml
Run #2		

NJDEP EPH List

CAS No.	Compound	Result	RL	Units	Q
	EPH (C9-C28)	8490	61	mg/kg	
	EPH (> C28-C40)	2120	61	mg/kg	
	Total EPH (C9-C40)	10600	61	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	100%		40-140%
3386-33-2	1-Chlorooctadecane	103%		40-140%

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Misc. Forms

Custody Documents and Other Forms

Includes the following where applicable:

- Chain of Custody

ACCUTEST LABORATORIES

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CHAIN OF CUSTODY

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PAGE 1 OF 4

FED-EX Tracking #
Bottle Order Control #
Accutest Quote #
Accutest Job # J74027

Client / Reporting Information

Company Name: ENVIROTRAC
Street Address: 400 CORPORATE CT
City: S. PLAINFIELD State: NJ Zip:
Project Contact: BILL GROELING E-mail:
Phone #: Fax #:
Sampler(s) Name(s): Phone #:

Project Information

Project Name: Hess Port Reading - Aeration Basin
Street: 750 Cliff Rd.
City: woodbridge State: NJ
Project #:
Client Purchase Order #:
Project Manager:

Billing Information (if different from Report to)
Company Name: Hess Corp
Street Address: 750 Cliff Rd.
City: woodbridge State: NJ Zip:
Attention: Howard Goldman

Requested Analysis (see TEST CODE sheet): BNDEPHCAT2NF

Matrix Codes: DW - Drinking Water, GW - Ground Water, WW - Water, SW - Surface Water, SO - Soil, SL- Sludge, SED-Sediment, OI - Oil, LIQ - Other Liquid, AIR - Air, SOL - Other Solid, WP - Wipe, FB-Field Blank, EB-Equipment Blank, RB- Rinse Blank, TB-Trip Blank

Accutest Sample #	Field ID / Point of Collection	MEOH/DI Vial #	Date	Time	Sampled by	Matrix	# of bottles	HCl	NaOH	HNO3	H2SO4	NONE	DI Water	MEOH	ENCORE	BNDEPHCAT2NF	LAB USE ONLY
1	SS-1		4-25-11	1050	KM	SO	1					1				X	UTC30
2	SS-2		↓	1052	↓	↓	↓					↓				↓	
3	SS-3			1055													
4	SS-4			1057													
5	SS-5			1100													
6	SS-6			1102													
7	SS-7			1105													
8	SS-8			1107													
9	SS-9			1110													
10	SS-10			1113													
11	SS-11			1115													
12	SS-12			1118													

Turnaround Time (Business days)

- [x] Std. 15 Business Days
- [ ] Std. 10 Business Days (by Contract only)
- [ ] 10 Day RUSH
- [ ] 5 Day RUSH
- [ ] 3 Day EMERGENCY
- [ ] 2 Day EMERGENCY
- [ ] 1 Day EMERGENCY

Approved By (Accutest PM): / Date:

Emergency & Rush T/A data available VIA Lablink

Data Deliverable Information

- [ ] Commercial "A" (Level 1)
- [ ] Commercial "B" (Level 2)
- [ ] FULLT1 (Level 3+4)
- [x] NJ Reduced
- [ ] Commercial "C"
- [ ] NYASP Category A
- [ ] NYASP Category B
- [ ] State Forms
- [ ] EDD Format
- [ ] Other

Commercial "A" = Results Only
Commercial "B" = Results + QC Summary
NJ Reduced = Results + QC Summary + Partial Raw data

Comments / Special Instructions

Samples Received Directly From Field Sampling

OK TO PROCEED KCM

Sample Custody must be documented below each time samples change possession, including courier delivery.

Relinquished by Sampler:	Date Time:	Received By:	Relinquished By:	Date Time:	Received By:
1 [signature]	4/25/11 1335	1 [signature]	2		2
Relinquished by Sampler: 3	Date Time:	Received By: 3	Relinquished By: 4	Date Time:	Received By: 4
Relinquished by: 5	Date Time:	Received By: 5	Custody Seal # —	☐ Intact ☐ Not intact	Preserved where applicable ☐ On Ice ☐ Cooler Temp. 21.5, 22.0°C

4.1

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JA74027: Chain of Custody
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CHAIN OF CUSTODY

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FED-EX Tracking #	Bottle Order Control #
Accutest Quote #	Accutest Job # JA74027

Client / Reporting Information

Company Name: ENVIROTRAC
Street Address: 400 CORPORATE CT
City: S. PLAINFIELD State: NJ Zip:
Project Contact: BILL LEWELLING E-mail:
Phone #: Fax #:
Sampler(s) Name(s): Phone #:

Project Information

Project Name: Hess Port Reading - Aeration Basin
Street: 750 Cliff Rd.
City: Woodbridge, State: NJ
Project #:
Client Purchase Order #:
Project Manager:

Billing Information (If different from Report to)
Company Name: Hess Corp
Street Address: 750 Cliff Rd.
City: Woodbridge, State: NJ Zip:
Attention: Howard Goldman

Requested Analysis (see TEST CODE sheet): BNJ EPH CAT 2 NF

Matrix Codes: DW - Drinking Water, GW - Ground Water, WW - Water, SW - Surface Water, SO - Soil, SL - Sludge, SED - Sediment, OI - Oil, LIQ - Other Liquid, AIR - Air, SOL - Other Solid, WP - Wipe, FB - Field Blank, EB - Equipment Blank, RB - Rinse Blank, TB - Trip Blank

Accutest Sample #	Field ID / Point of Collection	MEOH/DI Vial #	Date	Time	Sampled by	Matrix	# of bottles	HCl	NaOH	HNO3	H2SO4	NONE	DI Water	MEOH	ENCORE	BNJ EPH CAT 2 NF	LAB USE ONLY
13	SS-13		4-25-11	1121	KM	SO	1					1				X	
14	SS-14		↓	1127	↓	↓	↓					↓				↓	
15	SS-15			1132													
16	SS-16			1137													
17	SS-17			1142													
18	SS-18			1146													
19	SS-19			1150													
20	SS-20			1154													
21	SS-21			1159													
22	SS-22			1053	RD												
23	SS-23			1055	RD												
24	SS-24			1058	RD												

Turnaround Time (Business days)

- [x] Std. 15 Business Days
- [ ] Std. 10 Business Days (by Contract only)
- [ ] 10 Day RUSH
- [ ] 5 Day RUSH
- [ ] 3 Day EMERGENCY
- [ ] 2 Day EMERGENCY
- [ ] 1 Day EMERGENCY

Approved By (Accutest PM): / Date:

Emergency & Rush T/A data available VIA Lablink

Data Deliverable Information

- [ ] Commercial "A" (Level 1)
- [ ] Commercial "B" (Level 2)
- [ ] FULLT1 (Level 3+4)
- [x] NJ Reduced
- [ ] Commercial "C"
- [ ] NYASP Category A
- [ ] NYASP Category B
- [ ] State Forms
- [ ] EDD Format
- [ ] Other

Commercial "A" = Results Only
Commercial "B" = Results + QC Summary
NJ Reduced = Results + QC Summary + Partial Raw data

Comments / Special Instructions

Sample Custody must be documented below each time samples change possession, including courier delivery.

Relinquished by Sampler:	Date Time:	Received By:	Relinquished By:	Date Time:	Received By:
1 C. Mik	4/25/11 1335	1 [signature]	2		2
Relinquished by Sampler: 3	Date Time:	Received By: 3	Relinquished By: 4	Date Time:	Received By: 4
Relinquished by: 5	Date Time:	Received By: 5	Custody Seal #	☐ Intact ☐ Not intact	Preserved where applicable ☐ On Ice ☐ Cooler Temp.

JA74027: Chain of Custody
Page 2 of 5

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CHAIN OF CUSTODY

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FED-EX Tracking # | Bottle Order Control #
Accutest Quote # | Accutest Job # JA74027

Client / Reporting Information
Company Name: ENVIROTRAC
Street Address: 400 CORPORATE CT
City: S. PLAINFIELD State: NJ Zip:
Project Contact: BILL GROELING E-mail:
Phone #: Fax #:
Sampler(s) Name(s): Phone #:

Project Information
Project Name: Hess Port Reading - Aeration Basin
Street: 750 Cliff Rd.
City: Woodbridge, State: NJ
Project #:
Client Purchase Order #:
Project Manager:

Billing Information (if different from Report to)
Company Name: Hess Corp
Street Address: 750 Cliff Rd.
City: Woodbridge, State: NJ Zip:
Attention: Howard Goldman

Requested Analysis (see TEST CODE sheet): BN-SEPHCAT-LNF

Matrix Codes: DW - Drinking Water, GW - Ground Water, WW - Water, SW - Surface Water, SO - Soil, SL - Sludge, SED - Sediment, OI - Oil, LIQ - Other Liquid, AIR - Air, SOL - Other Solid, WP - Wipe, FB - Field Blank, EB - Equipment Blank, RB - Rinse Blank, TB - Trip Blank

Accutest Sample #	Field ID / Point of Collection	MEOH/DI Vial #	Date	Time	Sampled by	Matrix	# of bottles	HCl	NaOH	HNO3	H2SO4	NONE	DI Water	MEOH	ENCORE	BN-SEPHCAT-LNF	LAB USE ONLY
25	SS-25		4-25-11	1100	RD	SO	1					1				X	
26	SS-26		↓	1102	↓	↓	↓					↓				↓	
27	SS-27			1106													
28	SS-28			1108													
29	SS-29			1112													
30	SS-30			1115													
31	SS-31			1118													
32	SS-32			1121													
33	SS-33			1125													
34	SS-34			1128													
35	SS-35			1132													
36	SS-36			1136													

Turnaround Time (Business days)
- [x] Std. 15 Business Days
- [ ] Std. 10 Business Days (by Contract only)
- [ ] 10 Day RUSH
- [ ] 5 Day RUSH
- [ ] 3 Day EMERGENCY
- [ ] 2 Day EMERGENCY
- [ ] 1 Day EMERGENCY

Emergency & Rush T/A data available VIA Lablink

Approved By (Accutest PM): / Date:

Data Deliverable Information
- [ ] Commercial "A" (Level 1)
- [ ] Commercial "B" (Level 2)
- [ ] FULLT1 (Level 3+4)
- [x] NJ Reduced
- [ ] Commercial "C"
- [ ] NYASP Category A
- [ ] NYASP Category B
- [ ] State Forms
- [ ] EDD Format
- [ ] Other

Commercial "A" = Results Only
Commercial "B" = Results + QC Summary
NJ Reduced = Results + QC Summary + Partial Raw data

Comments / Special Instructions

Sample Custody must be documented below each time samples change possession, including courier delivery.

Relinquished by Sampler:	Date Time:	Received By:	Relinquished By:	Date Time:	Received By:
1 [signature]	4/25/11 1335	1 [signature]	2		2
Relinquished by Sampler: 3	Date Time:	Received By: 3	Relinquished By: 4	Date Time:	Received By: 4
Relinquished by: 5	Date Time:	Received By: 5	Custody Seal #	☐ Intact ☐ Not intact	Preserved where applicable ☐ On Ice ☐ Cooler Temp.

4.1

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JA74027: Chain of Custody
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FED-EX Tracking #: | Bottle Order Control #:
Accutest Quote #: | Accutest Job #: JA74027

Client / Reporting Information
Company Name: ENVIROTRAC
Street Address: 400 CORPORATE CT
City: S. PLAINFIELD State: NJ Zip:
Project Contact: BILL GRAELING E-mail:
Phone #: Fax #:
Sampler(s) Name(s): Phone #:

Project Information
Project Name: Hess Port Reading - Aeration Basin
Street: 750 Cliff Rd.
City: Woodbridge, State: NJ
Project #:
Client Purchase Order #:
Project Manager:

Billing Information (if different from Report to)
Company Name: Hess Corp
Street Address: 750 Cliff Rd,
City: Woodbridge, State: NJ Zip:
Attention: Howard Goldman

Requested Analysis (see TEST CODE sheet): BNJEPHCAT2NE

Matrix Codes: DW - Drinking Water, GW - Ground Water, WW - Water, SW - Surface Water, SO - Soil, SL - Sludge, SED - Sediment, OI - Oil, LIQ - Other Liquid, AIR - Air, SOL - Other Solid, WP - Wipe, FB - Field Blank, EB - Equipment Blank, RB - Rinse Blank, TB - Trip Blank

Accutest Sample #	Field ID / Point of Collection	MEOH/DI Vial #	Date	Time	Sampled by	Matrix	# of bottles	HCl	NaOH	HNO3	H2SO4	NONE	DI Water	MEOH	ENCORE	BNJEPHCAT2NE	LAB USE ONLY
37	SS-37		4-25-11	1139	RO	SO	1					1				X	
38	SS-38		↓	1141	↓	↓	↓					↓				↓	
39	SS-39		↓	1144	↓	↓	↓					↓				↓	
40	SS-40		↓	1148	↓	↓	↓					↓				↓	
41	SS-41		↓	1152	↓	↓	↓					↓				↓	
42	SS-42		↓	1156	↓	↓	↓					↓				↓	
43	SS-43		↓	1159	↓	↓	↓					↓				↓	
44	SS-44		↓	1203	↓	↓	↓					↓				↓	

Turnaround Time (Business days)
- [x] Std. 15 Business Days
- [ ] Std. 10 Business Days (by Contract only)
- [ ] 10 Day RUSH
- [ ] 5 Day RUSH
- [ ] 3 Day EMERGENCY
- [ ] 2 Day EMERGENCY
- [ ] 1 Day EMERGENCY

Approved By (Accutest PM): / Date:

Emergency & Rush T/A data available VIA Lablink

Data Deliverable Information
- [ ] Commercial "A" (Level 1)
- [ ] Commercial "B" (Level 2)
- [ ] FULLT1 (Level 3+4)
- [x] NJ Reduced
- [ ] Commercial "C"
- [ ] NYASP Category A
- [ ] NYASP Category B
- [ ] State Forms
- [ ] EDD Format
- [ ] Other

Commercial "A" = Results Only
Commercial "B" = Results + QC Summary
NJ Reduced = Results + QC Summary + Partial Raw data

Comments / Special Instructions

Sample Custody must be documented below each time samples change possession, including courier delivery.

Relinquished by Sampler:	Date Time:	Received By:	Relinquished By:	Date Time:	Received By:
1 C. Mk	4/25/11 1335	1 [signature]	2		2
Relinquished by Sampler: 3	Date Time:	Received By: 3	Relinquished By: 4	Date Time:	Received By: 4
Relinquished by: 5	Date Time:	Received By: 5	Custody Seal #	☐ Intact ☐ Not intact	Preserved where applicable ☐ On Ice ☐ Cooler Temp.

4.1

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JA74027: Chain of Custody
Page 4 of 5

Accutest Laboratories Sample Receipt Summary

Accutest Job Number: JA74027 **Client:** **Immediate Client Services Action Required:** No

Date / Time Received: 4/25/2011 **Delivery Method:** **Client Service Action Required at Login:** No

Project: **No. Coolers:** 2 **Airbill #'s:**

Cooler Security	Y	N		Y	N
1. Custody Seals Present:	☑	☐	3. COC Present:	☑	☐
2. Custody Seals Intact:	☑	☐	4. Smpl Dates/Time OK	☑	☐

Cooler Temperature	Y	N
1. Temp criteria achieved:	☑	☐
2. Cooler temp verification:	Infared gun	
3. Cooler media:	Ice (bag)	

Quality Control Preservatio	Y	N	N/A
1. Trip Blank present / cooler:	☐	☐	☑
2. Trip Blank listed on COC:	☐	☐	☑
3. Samples preserved properly:	☑	☐	
4. VOCs headspace free:	☐	☐	☑

Sample Integrity - Documentation	Y	N
1. Sample labels present on bottles:	☑	☐
2. Container labeling complete:	☑	☐
3. Sample container label / COC agree:	☑	☐

Sample Integrity - Condition	Y	N
1. Sample recvd within HT:	☑	☐
2. All containers accounted for:	☑	☐
3. Condition of sample:	Intact	

Sample Integrity - Instructions	Y	N	N/A
1. Analysis requested is clear:	☑	☐	
2. Bottles received for unspecified tests	☐	☑	
3. Sufficient volume recvd for analysis:	☑	☐	
4. Compositing instructions clear:	☐	☐	☑
5. Filtering instructions clear:	☐	☐	☑

Comments

JA74027: Chain of Custody
Page 5 of 5

New Jersey
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06/27/11

Technical Report for

EnviroTrac, Ltd.

Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ

Aeration Basin

Accutest Job Number: JA74026

Sampling Date: 04/25/11

Report to:

EnviroTrac, Ltd

phila@envirotrac.com

ATTN: Phil Allegro

Total number of pages in report: **70**

ACCREDITED IN ACCORDANCE WITH nelac

Test results contained within this data package meet the requirements of the National Environmental Laboratory Accreditation Conference and/or state specific certification programs as applicable.

David N. Speis
VP, Laboratory Director

Client Service contact: Matt Cordova 732-329-0200

Certifications: NJ(12129), NY(10983), CA, CT, DE, FL, IL, IN, KS, KY, LA, MA, MD, MI, MT, NC, PA, RI, SC, TN, VA, WV

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Table of Contents

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Sample Summary

EnviroTrac, Ltd.

Job No: JA74026

Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ
Project No: Aeration Basin

Sample Number	Collected Date	Time By	Received	Matrix Code	Type	Client Sample ID
JA74026-1	04/25/11	12:31 KM	04/25/11	SO	Soil	WC-1
JA74026-1A	04/25/11	12:31 KM	04/25/11	SO	Soil	WC-1
JA74026-2	04/25/11	12:42 KM	04/25/11	SO	Soil	WC-2
JA74026-2A	04/25/11	12:42 KM	04/25/11	SO	Soil	WC-2
JA74026-3	04/25/11	12:54 KM	04/25/11	SO	Soil	WC-3
JA74026-3A	04/25/11	12:54 KM	04/25/11	SO	Soil	WC-3
JA74026-4	04/25/11	12:34 KM	04/25/11	SO	Soil	WC-4
JA74026-4A	04/25/11	12:34 KM	04/25/11	SO	Soil	WC-4
JA74026-5	04/25/11	12:40 KM	04/25/11	SO	Soil	WC-5
JA74026-5A	04/25/11	12:40 KM	04/25/11	SO	Soil	WC-5
JA74026-6	04/25/11	12:46 KM	04/25/11	SO	Soil	WC-6
JA74026-6A	04/25/11	12:46 KM	04/25/11	SO	Soil	WC-6

Soil samples reported on a dry weight basis unless otherwise indicated on result page.

CASE NARRATIVE / CONFORMANCE SUMMARY

Client: EnviroTrac, Ltd. **Job No** JA74026

Site: Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ **Report Date** 5/12/2011 12:07:06 P

On 04/25/2011, 12 Sample(s), 0 Trip Blank(s) and 0 Field Blank(s) were received at Accutest Laboratories at a temperature of 22 C. Samples were intact and properly preserved, unless noted below. An Accutest Job Number of JA74026 was assigned to the project. Laboratory sample ID, client sample ID and dates of sample collection are detailed in the report's Results Summary Section. ** (Samples received directly from field sampling and OK to run.)

Specified quality control criteria were achieved for this job except as noted below. For more information, please refer to the analytical results and QC summary pages.

Volatiles by GCMS By Method SW846 8260B

Matrix: SO **Batch ID:** VD7371

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JA73932-7MS, JA73932-7MSD were used as the QC samples indicated.
- Matrix Spike Recovery(s) for Acetone are outside control limits. Outside control limits due to matrix interference.
- Matrix Spike Duplicate Recovery(s) for Acetone are outside control limits. Outside control limits due to matrix interference.
- Matrix Spike Recovery(s) for Chlorobenzene are outside control limits. Outside control limits due to high level in sample relative to spike amount.
- JA74026-1: Dilution required due to matrix interference.
- JA74026-3: Dilution required due to matrix interference.
- JA74026-5: Dilution required due to matrix interference.
- JA74026-6: Dilution required due to matrix interference.

Matrix: SO **Batch ID:** VX4832

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JA73998-1DUP, JA73998-2MS were used as the QC samples indicated.

Extractables by GCMS By Method SW846 8270C

Matrix: SO	Batch ID: OP49395

- All samples were extracted within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JA74026-6MS, JA74026-6MSD were used as the QC samples indicated.
- Matrix Spike Recovery(s) for 1,2,4,5-Tetrachlorobenzene, 2,3,4,6-Tetrachlorophenol, 2,4,5-Trichlorophenol, 2,4,6-Trichlorophenol, 2,4-Dichlorophenol, 2,4-Dinitrophenol, 2,4-Dinitrotoluene, 2,6-Dinitrotoluene, 2-Chloronaphthalene, 2-Methylnaphthalene, 2-Nitroaniline, 2-Nitrophenol, 3,3'-Dichlorobenzidine, 3-Nitroaniline, 4-Bromophenyl phenyl ether, 4-Chlorophenyl phenyl ether, 4-Nitrophenol, Acenaphthene, Acenaphthylene, Anthracene, Atrazine, bis(2-Chloroisopropyl)ether, Caprolactam, Carbazole, Chrysene, Dibenzofuran, Dimethyl phthalate, Fluoranthene, Fluorene, Hexachlorobenzene, Hexachlorobutadiene, Hexachlorocyclopentadiene, N-Nitroso-di-n-propylamine, N-Nitrosodiphenylamine, Naphthalene, Nitrobenzene, Pyrene are outside control limits. Outside control limits due to matrix interference and dilution.
- Matrix Spike Duplicate Recovery(s) for 1,2,4,5-Tetrachlorobenzene, 2,3,4,6-Tetrachlorophenol, 2,4,5-Trichlorophenol, 2,4,6-Trichlorophenol, 2,4-Dichlorophenol, 2,4-Dinitrophenol, 2,4-Dinitrotoluene, 2,6-Dinitrotoluene, 2-Chloronaphthalene, 2-Methylnaphthalene, 2-Nitroaniline, 2-Nitrophenol, 4-Bromophenyl phenyl ether, 4-Chlorophenyl phenyl ether, 4-Nitrophenol, Acenaphthene, Acenaphthylene, Anthracene, Atrazine, bis(2-Chloroisopropyl)ether, Caprolactam, Carbazole, Chrysene, Dibenzofuran, Dimethyl phthalate, Fluoranthene, Fluorene, Hexachlorobenzene, Hexachlorobutadiene, Hexachlorocyclopentadiene, Naphthalene, Nitrobenzene, 4-Chloro-3-methyl phenol, Butyl benzyl phthalate are outside control limits. Outside control limits due to matrix interference and dilution.
- RPD(s) for MS/MSD for 3,3'-Dichlorobenzidine, 3-Nitroaniline, 4-Chloro-3-methyl phenol, Butyl benzyl phthalate, Hexachloroethane are outside control limits for sample OP49395-MSD. Outside control limits due to matrix interference and dilution.
- JA74026-1: Dilution required due to viscosity of extract matrix
- JA74026-2: Confirmation run for internal standard areas.
- JA74026-3: Dilution required due to viscosity of extract matrix
- JA74026-4: Dilution required due to viscosity of extract matrix
- JA74026-5: Confirmation run for internal standard areas.
- JA74026-5: Dilution required due to viscosity of extract matrix
- JA74026-6: Dilution required due to viscosity of extract matrix
- OP49395-MS/MSD: Dilution required due to viscosity of extract matrix
- JA74026-2: Dilution required due to viscosity of extract matrix
- OP49395-MS/MSD for 2-Fluorobiphenyl: Outside control limits due to matrix interference and dilution.
- OP49395-MS/MSD for Phenanthrene : Outside control limits due to high level in sample relative to spike amount.
- OP49395-/MSMSD for 2,4,6-Tribromophenol: Outside control limits due to matrix interference and dilution.

Extractables by GC By Method SW846 8082

Matrix: SO	Batch ID: OP49392

- All samples were extracted within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JA74034-1MS, JA74034-1MSD were used as the QC samples indicated.
- JA74026-4 for Aroclor 1254: Reported from 2nd signal. %D of end check (ECC) on 1st signal excess method criteria (15 %) so using for confirmation only.
- JA74026-2 for Aroclor 1254: Reported from 2nd signal. %D of end check (ECC) on 1st signal excess method criteria (15 %) so using for confirmation only.
- JA74026-1 for Aroclor 1254: Reported from 2nd signal. %D of end check (ECC) on 1st signal excess method criteria (15 %) so using for confirmation only.

Metals By Method SW846 6010B

Matrix: LEACHATE	**Batch ID:** MP57937

- All samples were digested within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JA74208-1MS, JA74208-1MSD, JA74208-1SDL were used as the QC samples for metals.
- RPD(s) for Serial Dilution for Chromium, Selenium, Silver are outside control limits for sample MP57937-SD1. Percent difference acceptable due to low initial sample concentration (< 50 times IDL).

Matrix: LEACHATE	**Batch ID:** MP58048

- All samples were digested within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JA74026-5MS, JA74026-5MSD, JA74026-5SDL were used as the QC samples for metals.
- RPD(s) for Serial Dilution for Arsenic, Cadmium, Lead, Selenium are outside control limits for sample MP58048-SD1. Percent difference acceptable due to low initial sample concentration (< 50 times IDL).

Matrix: SO	**Batch ID:** MP58049

- All samples were digested within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JA73468-4MS, JA73468-4MSD, JA73468-4SDL were used as the QC samples for metals.
- Matrix Spike Recovery(s) for Antimony are outside control limits. Spike recovery indicates possible matrix interference and/or sample nonhomogeneity.
- Matrix Spike Duplicate Recovery(s) for Antimony are outside control limits. Spike recovery indicates possible matrix interference and/or sample nonhomogeneity.
- RPD(s) for Serial Dilution for Beryllium, Arsenic, Selenium are outside control limits for sample MP58049-SD1. Percent difference acceptable due to low initial sample concentration (< 50 times IDL).
- MP58049-SD1 for Chromium: Serial dilution indicates possible matrix interference.
- MP58049-SD1 for Zinc: Serial dilution indicates possible matrix interference.

Metals By Method SW846 7470A

Matrix: LEACHATE	**Batch ID:** MP57972

- All samples were digested within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JA74208-1MS, JA74208-1MSD were used as the QC samples for metals.

Matrix: LEACHATE	**Batch ID:** MP58106

- All samples were digested within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JA74026-5MS, JA74026-5MSD were used as the QC samples for metals.

Metals By Method SW846 7471A

Matrix: SO	**Batch ID:** MP58105

- All samples were digested within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JA74432-2MS, JA74432-2MSD were used as the QC samples for metals.

Wet Chemistry By Method SM18 2540G

Matrix: SO	**Batch ID:** GN50512

- The data for SM18 2540G meets quality control requirements.

Wet Chemistry By Method SW846 9095B

Matrix: SO **Batch ID:** GN50217

- Sample(s) JA73937-1DUP were used as the QC samples for Paint Filter Test.
- JA74026-6 for Paint Filter Test: No free liquids.
- JA74026-1 for Paint Filter Test: No free liquids.
- JA74026-2 for Paint Filter Test: No free liquids.
- JA74026-3 for Paint Filter Test: No free liquids.
- JA74026-4 for Paint Filter Test: No free liquids.
- JA74026-5 for Paint Filter Test: No free liquids.

Accutest certifies that data reported for samples received, listed on the associated custody chain or analytical task order, were produced to specifications meeting Accutest's Quality System precision, accuracy and completeness objectives except as noted.

Estimated non-standard method measurement uncertainty data is available on request, based on quality control bias and implicit for standard methods. Acceptable uncertainty requires tested parameter quality control data to meet method criteria.

Accutest Laboratories is not responsible for data quality assumptions if partial reports are used and recommends that this report be used in its entirety. Data release is authorized by Accutest Laboratories indicated via signature on the report cover

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LABORATORIES

Sample Results

Report of Analysis

Report of Analysis

Client Sample ID:	WC-1		
Lab Sample ID:	JA74026-1	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	SW846 8260B SW846 5035	**Percent Solids:**	79.6
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	D181523.D	1	04/29/11	MAH	04/26/11 09:00	n/a	VD7371
Run #2							

	Initial Weight	Final Volume	Methanol Aliquot
Run #1	5.3 g	5.0 ml	100 ul
Run #2			

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	720	160	ug/kg	
71-43-2	Benzene	ND	72	25	ug/kg	
74-97-5	Bromochloromethane	ND	360	16	ug/kg	
75-27-4	Bromodichloromethane	ND	360	19	ug/kg	
75-25-2	Bromoform	ND	360	11	ug/kg	
74-83-9	Bromomethane	ND	360	29	ug/kg	
78-93-3	2-Butanone (MEK)	ND	720	140	ug/kg	
75-15-0	Carbon disulfide	ND	360	22	ug/kg	
56-23-5	Carbon tetrachloride	ND	360	40	ug/kg	
108-90-7	Chlorobenzene	ND	360	24	ug/kg	
75-00-3	Chloroethane	ND	360	72	ug/kg	
67-66-3	Chloroform	ND	360	23	ug/kg	
74-87-3	Chloromethane	ND	360	12	ug/kg	
110-82-7	Cyclohexane	53.0	360	11	ug/kg	J
96-12-8	1,2-Dibromo-3-chloropropane	ND	720	39	ug/kg	
124-48-1	Dibromochloromethane	ND	360	7.9	ug/kg	
106-93-4	1,2-Dibromoethane	ND	72	9.9	ug/kg	
95-50-1	1,2-Dichlorobenzene	ND	360	19	ug/kg	
541-73-1	1,3-Dichlorobenzene	ND	360	20	ug/kg	
106-46-7	1,4-Dichlorobenzene	ND	360	24	ug/kg	
75-71-8	Dichlorodifluoromethane	ND	360	68	ug/kg	
75-34-3	1,1-Dichloroethane	ND	360	9.9	ug/kg	
107-06-2	1,2-Dichloroethane	ND	72	25	ug/kg	
75-35-4	1,1-Dichloroethene	ND	360	48	ug/kg	
156-59-2	cis-1,2-Dichloroethene	ND	360	17	ug/kg	
156-60-5	trans-1,2-Dichloroethene	ND	360	32	ug/kg	
78-87-5	1,2-Dichloropropane	ND	360	9.4	ug/kg	
10061-01-5	cis-1,3-Dichloropropene	ND	360	9.6	ug/kg	
10061-02-6	trans-1,3-Dichloropropene	ND	360	6.9	ug/kg	
123-91-1	1,4-Dioxane	ND	9000	6200	ug/kg	
100-41-4	Ethylbenzene	175	72	27	ug/kg	
76-13-1	Freon 113	ND	360	41	ug/kg	

ND = Not detected MDL - Method Detection Limit J = Indicates an estimated value
RL = Reporting Limit B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	WC-1		
Lab Sample ID:	JA74026-1	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	SW846 8260B SW846 5035	**Percent Solids:**	79.6
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
591-78-6	2-Hexanone	ND	360	69	ug/kg	
98-82-8	Isopropylbenzene	ND	360	37	ug/kg	
79-20-9	Methyl Acetate	76.9	360	59	ug/kg	J
108-87-2	Methylcyclohexane	160	360	47	ug/kg	J
1634-04-4	Methyl Tert Butyl Ether	ND	72	20	ug/kg	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	360	58	ug/kg	
75-09-2	Methylene chloride	ND	360	16	ug/kg	
100-42-5	Styrene	ND	360	7.7	ug/kg	
75-65-0	Tert Butyl Alcohol	ND	1800	1000	ug/kg	
79-34-5	1,1,2,2-Tetrachloroethane	ND	360	21	ug/kg	
127-18-4	Tetrachloroethene	ND	360	10	ug/kg	
108-88-3	Toluene	ND	72	21	ug/kg	
87-61-6	1,2,3-Trichlorobenzene	ND	360	43	ug/kg	
120-82-1	1,2,4-Trichlorobenzene	ND	360	25	ug/kg	
71-55-6	1,1,1-Trichloroethane	ND	360	9.2	ug/kg	
79-00-5	1,1,2-Trichloroethane	ND	360	13	ug/kg	
79-01-6	Trichloroethene	ND	360	38	ug/kg	
75-69-4	Trichlorofluoromethane	ND	360	17	ug/kg	
75-01-4	Vinyl chloride	ND	360	13	ug/kg	
	m,p-Xylene	ND	140	34	ug/kg	
95-47-6	o-Xylene	ND	72	34	ug/kg	
1330-20-7	Xylene (total)	37.6	140	34	ug/kg	J

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	96%		67-131%
17060-07-0	1,2-Dichloroethane-D4	107%		66-130%
2037-26-5	Toluene-D8	103%		76-125%
460-00-4	4-Bromofluorobenzene	105%		53-142%

CAS No.	Tentatively Identified Compounds	R.T.	Est. Conc.	Units	Q
	unknown	11.73	1200	ug/kg	J
	alkane	11.90	1200	ug/kg	J
	cycloalkane/alkene	13.50	1900	ug/kg	J
	alkane	14.93	2200	ug/kg	J
	cycloalkane/alkene	15.08	2400	ug/kg	J
	cycloalkane/alkene	15.54	1700	ug/kg	J
	cycloalkane/alkene	16.44	1900	ug/kg	J
	Naphthalene methyl	17.06	2900	ug/kg	J

ND = Not detected   MDL - Method Detection Limit   J = Indicates an estimated value
RL = Reporting Limit   B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range   N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	WC-1		
Lab Sample ID:	JA74026-1	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	SW846 8260B SW846 5035	**Percent Solids:**	79.6
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

VOA TCL List (SOM0 1.1)

CAS No.	Tentatively Identified Compounds	R.T.	Est. Conc.	Units	Q
	unknown	17.75	3400	ug/kg	J
	unknown	17.99	2200	ug/kg	J
	C5 alkyl benzene	18.07	1400	ug/kg	J
	unknown	18.43	1300	ug/kg	J
	unknown	18.68	1600	ug/kg	J
	unknown	19.21	3200	ug/kg	J
	C5 alkyl benzene	19.64	1500	ug/kg	J
	Total TIC, Volatile		30000	ug/kg	J

(a) Dilution required due to matrix interference.

ND = Not detected MDL - Method Detection Limit J = Indicates an estimated value
RL = Reporting Limit B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	WC-1		
Lab Sample ID:	JA74026-1	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	SW846 8270C SW846 3550B	**Percent Solids:**	79.6
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	Z63117.D	2	04/29/11	KLS	04/27/11	OP49395	EZ3351
Run #2							

	Initial Weight	Final Volume
Run #1	35.1 g	1.0 ml
Run #2		

ABN TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
95-57-8	2-Chlorophenol	ND	360	72	ug/kg	
59-50-7	4-Chloro-3-methyl phenol	ND	360	72	ug/kg	
120-83-2	2,4-Dichlorophenol	ND	360	120	ug/kg	
105-67-9	2,4-Dimethylphenol	ND	360	120	ug/kg	
51-28-5	2,4-Dinitrophenol	ND	1400	87	ug/kg	
534-52-1	4,6-Dinitro-o-cresol	ND	1400	87	ug/kg	
95-48-7	2-Methylphenol	ND	140	82	ug/kg	
	3&4-Methylphenol	ND	140	91	ug/kg	
88-75-5	2-Nitrophenol	ND	360	76	ug/kg	
100-02-7	4-Nitrophenol	ND	720	120	ug/kg	
87-86-5	Pentachlorophenol	ND	720	120	ug/kg	
108-95-2	Phenol	ND	140	75	ug/kg	
58-90-2	2,3,4,6-Tetrachlorophenol	ND	360	74	ug/kg	
95-95-4	2,4,5-Trichlorophenol	ND	360	83	ug/kg	
88-06-2	2,4,6-Trichlorophenol	ND	360	67	ug/kg	
83-32-9	Acenaphthene	1830	72	21	ug/kg	
208-96-8	Acenaphthylene	ND	72	23	ug/kg	
98-86-2	Acetophenone	ND	360	13	ug/kg	
120-12-7	Anthracene	737	72	25	ug/kg	
1912-24-9	Atrazine	ND	360	14	ug/kg	
56-55-3	Benzo(a)anthracene	577	72	23	ug/kg	
50-32-8	Benzo(a)pyrene	342	72	22	ug/kg	
205-99-2	Benzo(b)fluoranthene	232	72	24	ug/kg	
191-24-2	Benzo(g,h,i)perylene	83.2	72	27	ug/kg	
207-08-9	Benzo(k)fluoranthene	124	72	27	ug/kg	
101-55-3	4-Bromophenyl phenyl ether	ND	140	26	ug/kg	
85-68-7	Butyl benzyl phthalate	ND	140	41	ug/kg	
92-52-4	1,1'-Biphenyl	ND	140	8.3	ug/kg	
100-52-7	Benzaldehyde	ND	360	16	ug/kg	
91-58-7	2-Chloronaphthalene	ND	140	22	ug/kg	
106-47-8	4-Chloroaniline	ND	360	23	ug/kg	
86-74-8	Carbazole	ND	140	33	ug/kg	

ND = Not detected MDL - Method Detection Limit J = Indicates an estimated value
RL = Reporting Limit B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	WC-1		
Lab Sample ID:	JA74026-1	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	SW846 8270C SW846 3550B	**Percent Solids:**	79.6
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

ABN TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
105-60-2	Caprolactam	ND	140	23	ug/kg	
218-01-9	Chrysene	1150	72	24	ug/kg	
111-91-1	bis(2-Chloroethoxy)methane	ND	140	29	ug/kg	
111-44-4	bis(2-Chloroethyl)ether	ND	140	22	ug/kg	
108-60-1	bis(2-Chloroisopropyl)ether	ND	140	21	ug/kg	
7005-72-3	4-Chlorophenyl phenyl ether	ND	140	22	ug/kg	
121-14-2	2,4-Dinitrotoluene	ND	140	31	ug/kg	
606-20-2	2,6-Dinitrotoluene	ND	140	27	ug/kg	
91-94-1	3,3'-Dichlorobenzidine	ND	360	18	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	ND	72	24	ug/kg	
132-64-9	Dibenzofuran	650	140	21	ug/kg	
84-74-2	Di-n-butyl phthalate	ND	140	16	ug/kg	
117-84-0	Di-n-octyl phthalate	ND	140	35	ug/kg	
84-66-2	Diethyl phthalate	ND	140	24	ug/kg	
131-11-3	Dimethyl phthalate	ND	140	25	ug/kg	
117-81-7	bis(2-Ethylhexyl)phthalate	1020	140	63	ug/kg	
206-44-0	Fluoranthene	417	72	32	ug/kg	
86-73-7	Fluorene	2620	72	23	ug/kg	
118-74-1	Hexachlorobenzene	ND	140	23	ug/kg	
87-68-3	Hexachlorobutadiene	ND	72	20	ug/kg	
77-47-4	Hexachlorocyclopentadiene	ND	1400	73	ug/kg	
67-72-1	Hexachloroethane	ND	360	20	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	70.2	72	25	ug/kg	J
78-59-1	Isophorone	ND	140	19	ug/kg	
91-57-6	2-Methylnaphthalene	ND	140	40	ug/kg	
88-74-4	2-Nitroaniline	ND	360	31	ug/kg	
99-09-2	3-Nitroaniline	ND	360	29	ug/kg	
100-01-6	4-Nitroaniline	ND	360	28	ug/kg	
91-20-3	Naphthalene	ND	72	20	ug/kg	
98-95-3	Nitrobenzene	ND	140	21	ug/kg	
621-64-7	N-Nitroso-di-n-propylamine	ND	140	17	ug/kg	
86-30-6	N-Nitrosodiphenylamine	ND	360	43	ug/kg	
85-01-8	Phenanthrene	3390	72	33	ug/kg	
129-00-0	Pyrene	1760	72	27	ug/kg	
95-94-3	1,2,4,5-Tetrachlorobenzene	ND	360	22	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	70%		21-116%
4165-62-2	Phenol-d5	72%		19-117%

ND = Not detected MDL - Method Detection Limit J = Indicates an estimated value
RL = Reporting Limit B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	WC-1		
Lab Sample ID:	JA74026-1	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	SW846 8270C SW846 3550B	**Percent Solids:**	79.6
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

ABN TCL List (SOM0 1.1)

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
118-79-6	2,4,6-Tribromophenol	58%		24-136%
4165-60-0	Nitrobenzene-d5	89%		21-122%
321-60-8	2-Fluorobiphenyl	72%		30-117%
1718-51-0	Terphenyl-d14	69%		31-129%

CAS No.	Tentatively Identified Compounds	R.T.	Est. Conc.	Units	Q
	system artifact	2.71	4400	ug/kg	J
	alkane	6.77	5200	ug/kg	J
	cycloalkane/alkene	7.07	4000	ug/kg	J
	alkane	7.34	14000	ug/kg	J
	unknown	7.64	4500	ug/kg	J
90-12-0	Naphthalene, 1-methyl-	7.87	6900	ug/kg	JN
	Naphthalene dimethyl	8.71	6200	ug/kg	J
	Naphthalene dimethyl	8.85	7200	ug/kg	J
	alkane	9.04	25000	ug/kg	J
	Naphthalene dimethyl	9.16	4900	ug/kg	J
	unknown	9.21	4400	ug/kg	J
	Naphthalene trimethyl	9.55	5700	ug/kg	J
	Naphthalene trimethyl	9.74	11000	ug/kg	J
	Naphthalene trimethyl	9.79	12000	ug/kg	J
	Naphthalene trimethyl	9.93	4000	ug/kg	J
	Naphthalene trimethyl	10.05	6800	ug/kg	J
	unknown	10.35	11000	ug/kg	J
	unknown	10.40	4600	ug/kg	J
	unknown	10.46	3900	ug/kg	J
	unknown	10.53	15000	ug/kg	J
	alkane	13.53	4900	ug/kg	J
	unknown	13.57	6800	ug/kg	J
	unknown	13.64	5300	ug/kg	J
	unknown	13.83	4300	ug/kg	J
	unknown	13.87	12000	ug/kg	J
	unknown	14.97	5900	ug/kg	J
	Total TIC, Semi-Volatile		195500	ug/kg	J

(a) Dilution required due to viscosity of extract matrix

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	WC-1		
Lab Sample ID:	JA74026-1	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	SW846 8082 SW846 3545	**Percent Solids:**	79.6
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	XX106805.D	1	04/29/11	AZ	04/27/11	OP49392	GXX4046
Run #2							

	Initial Weight	Final Volume
Run #1	17.1 g	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	37	13	ug/kg	
11104-28-2	Aroclor 1221	ND	37	24	ug/kg	
11141-16-5	Aroclor 1232	ND	37	12	ug/kg	
53469-21-9	Aroclor 1242	ND	37	13	ug/kg	
12672-29-6	Aroclor 1248	ND	37	7.3	ug/kg	
11097-69-1	Aroclor 1254 [a]	466	37	9.3	ug/kg	
11096-82-5	Aroclor 1260	ND	37	14	ug/kg	
11100-14-4	Aroclor 1268	ND	37	8.3	ug/kg	
37324-23-5	Aroclor 1262	ND	37	7.4	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	84%		22-141%
877-09-8	Tetrachloro-m-xylene	51%		22-141%
2051-24-3	Decachlorobiphenyl	76%		18-163%
2051-24-3	Decachlorobiphenyl	92%		18-163%

(a) Reported from 2nd signal. %D of end check (ECC) on 1st signal excess method criteria (15 %) so using for confirmation only.

ND = Not detected MDL - Method Detection Limit J = Indicates an estimated value
RL = Reporting Limit B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	WC-1		
Lab Sample ID:	JA74026-1	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
		Percent Solids:	79.6
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

Metals Analysis, TCLP Leachate SW846 1311

Analyte	Result	HW#	MCL	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Arsenic	< 0.50	D004	5.0	0.50	mg/l	1	04/29/11	05/02/11	ND	SW846 6010B [1]	SW846 3010A [3]
Barium	< 1.0	D005	100	1.0	mg/l	1	04/29/11	05/02/11	ND	SW846 6010B [1]	SW846 3010A [3]
Cadmium	< 0.0050	D006	1.0	0.0050	mg/l	1	04/29/11	05/02/11	ND	SW846 6010B [1]	SW846 3010A [3]
Chromium	0.29	D007	5.0	0.010	mg/l	1	04/29/11	05/02/11	ND	SW846 6010B [1]	SW846 3010A [3]
Lead	< 0.50	D008	5.0	0.50	mg/l	1	04/29/11	05/02/11	ND	SW846 6010B [1]	SW846 3010A [3]
Mercury	< 0.00020	D009	0.20	0.00020	mg/l	1	05/09/11	05/09/11	VK	SW846 7470A [2]	SW846 7470A [4]
Selenium	< 0.50	D010	1.0	0.50	mg/l	1	04/29/11	05/02/11	ND	SW846 6010B [1]	SW846 3010A [3]
Silver	< 0.010	D011	5.0	0.010	mg/l	1	04/29/11	05/02/11	ND	SW846 6010B [1]	SW846 3010A [3]

(1) Instrument QC Batch: MA26272
(2) Instrument QC Batch: MA26332
(3) Prep QC Batch: MP57937
(4) Prep QC Batch: MP57972

RL = Reporting Limit
MCL = Maximum Contamination Level (40 CFR 261 6/96)

Report of Analysis

Client Sample ID:	WC-1		
Lab Sample ID:	JA74026-1	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
		Percent Solids:	79.6
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Paint Filter Test [a]	< 0.50	0.50	ml/100g	1	04/28/11	LMM	SW846 9095B
Solids, Percent	79.6		%	1	05/06/11	JB	SM18 2540G

(a) No free liquids.

RL = Reporting Limit

Report of Analysis

Client Sample ID:	WC-1		
Lab Sample ID:	JA74026-1A	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
		Percent Solids:	79.6
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Antimony	6.3	2.6	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]
Arsenic	19.4	2.6	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]
Beryllium	0.57	0.26	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [2]	SW846 3050B [4]
Cadmium	1.7	0.65	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]
Chromium	933	1.3	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]
Copper	158	3.2	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]
Lead	135	2.6	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]
Mercury	0.87	0.040	mg/kg	1	05/09/11	05/09/11	JW	SW846 7471A [3]	SW846 7471A [5]
Nickel	64.0	5.2	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]
Selenium	< 2.6	2.6	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]
Silver	< 0.65	0.65	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]
Thallium	< 1.3	1.3	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]
Zinc	594	2.6	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]

(1) Instrument QC Batch: MA26318
(2) Instrument QC Batch: MA26321
(3) Instrument QC Batch: MA26329
(4) Prep QC Batch: MP58049
(5) Prep QC Batch: MP58105

RL = Reporting Limit

Report of Analysis

Client Sample ID:	WC-2		
Lab Sample ID:	JA74026-2	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	SW846 8260B SW846 5035	**Percent Solids:**	76.4
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	X113916.D	1	04/26/11	JTP	04/26/11 09:00	n/a	VX4832
Run #2							

	Initial Weight
Run #1	4.9 g
Run #2	

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	13	3.0	ug/kg	
71-43-2	Benzene	ND	1.3	0.46	ug/kg	
74-97-5	Bromochloromethane	ND	6.7	0.29	ug/kg	
75-27-4	Bromodichloromethane	ND	6.7	0.34	ug/kg	
75-25-2	Bromoform	ND	6.7	0.20	ug/kg	
74-83-9	Bromomethane	ND	6.7	0.54	ug/kg	
78-93-3	2-Butanone (MEK)	ND	13	2.6	ug/kg	
75-15-0	Carbon disulfide	ND	6.7	0.41	ug/kg	
56-23-5	Carbon tetrachloride	ND	6.7	0.74	ug/kg	
108-90-7	Chlorobenzene	ND	6.7	0.45	ug/kg	
75-00-3	Chloroethane	ND	6.7	1.3	ug/kg	
67-66-3	Chloroform	ND	6.7	0.42	ug/kg	
74-87-3	Chloromethane	ND	6.7	0.22	ug/kg	
110-82-7	Cyclohexane	ND	6.7	0.20	ug/kg	
96-12-8	1,2-Dibromo-3-chloropropane	ND	13	0.72	ug/kg	
124-48-1	Dibromochloromethane	ND	6.7	0.15	ug/kg	
106-93-4	1,2-Dibromoethane	ND	1.3	0.18	ug/kg	
95-50-1	1,2-Dichlorobenzene	ND	6.7	0.36	ug/kg	
541-73-1	1,3-Dichlorobenzene	ND	6.7	0.37	ug/kg	
106-46-7	1,4-Dichlorobenzene	ND	6.7	0.45	ug/kg	
75-71-8	Dichlorodifluoromethane	ND	6.7	1.3	ug/kg	
75-34-3	1,1-Dichloroethane	ND	6.7	0.18	ug/kg	
107-06-2	1,2-Dichloroethane	ND	1.3	0.46	ug/kg	
75-35-4	1,1-Dichloroethene	ND	6.7	0.88	ug/kg	
156-59-2	cis-1,2-Dichloroethene	ND	6.7	0.32	ug/kg	
156-60-5	trans-1,2-Dichloroethene	ND	6.7	0.60	ug/kg	
78-87-5	1,2-Dichloropropane	ND	6.7	0.17	ug/kg	
10061-01-5	cis-1,3-Dichloropropene	ND	6.7	0.18	ug/kg	
10061-02-6	trans-1,3-Dichloropropene	ND	6.7	0.13	ug/kg	
123-91-1	1,4-Dioxane	ND	170	120	ug/kg	
100-41-4	Ethylbenzene	ND	1.3	0.50	ug/kg	
76-13-1	Freon 113	ND	6.7	0.75	ug/kg	

ND = Not detected   MDL - Method Detection Limit   J = Indicates an estimated value
RL = Reporting Limit   B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range   N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	WC-2		
Lab Sample ID:	JA74026-2	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	SW846 8260B SW846 5035	**Percent Solids:**	76.4
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
591-78-6	2-Hexanone	ND	6.7	1.3	ug/kg	
98-82-8	Isopropylbenzene	ND	6.7	0.69	ug/kg	
79-20-9	Methyl Acetate	ND	6.7	1.1	ug/kg	
108-87-2	Methylcyclohexane	ND	6.7	0.87	ug/kg	
1634-04-4	Methyl Tert Butyl Ether	ND	1.3	0.38	ug/kg	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	6.7	1.1	ug/kg	
75-09-2	Methylene chloride	ND	6.7	0.30	ug/kg	
100-42-5	Styrene	ND	6.7	0.14	ug/kg	
75-65-0	Tert Butyl Alcohol	ND	33	19	ug/kg	
79-34-5	1,1,2,2-Tetrachloroethane	ND	6.7	0.39	ug/kg	
127-18-4	Tetrachloroethene	ND	6.7	0.19	ug/kg	
108-88-3	Toluene	ND	1.3	0.39	ug/kg	
87-61-6	1,2,3-Trichlorobenzene	ND	6.7	0.79	ug/kg	
120-82-1	1,2,4-Trichlorobenzene	ND	6.7	0.46	ug/kg	
71-55-6	1,1,1-Trichloroethane	ND	6.7	0.17	ug/kg	
79-00-5	1,1,2-Trichloroethane	ND	6.7	0.25	ug/kg	
79-01-6	Trichloroethene	ND	6.7	0.70	ug/kg	
75-69-4	Trichlorofluoromethane	ND	6.7	0.31	ug/kg	
75-01-4	Vinyl chloride	ND	6.7	0.24	ug/kg	
	m,p-Xylene	ND	2.7	0.63	ug/kg	
95-47-6	o-Xylene	ND	1.3	0.63	ug/kg	
1330-20-7	Xylene (total)	ND	2.7	0.63	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	108%		67-131%
17060-07-0	1,2-Dichloroethane-D4	110%		66-130%
2037-26-5	Toluene-D8	104%		76-125%
460-00-4	4-Bromofluorobenzene	113%		53-142%

CAS No.	Tentatively Identified Compounds	R.T.	Est. Conc.	Units	Q
	alkane	20.14	9.3	ug/kg	J
	alkane	21.13	6.8	ug/kg	J
	Total TIC, Volatile		16.1	ug/kg	J

ND = Not detected　　MDL - Method Detection Limit　　J = Indicates an estimated value
RL = Reporting Limit　　B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range　　N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	WC-2		
Lab Sample ID:	JA74026-2	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	SW846 8270C SW846 3550B	**Percent Solids:**	76.4
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	Z63118.D	2	04/29/11	KLS	04/27/11	OP49395	EZ3351
Run #2 [b]	Z63266.D	2	05/09/11	KLS	04/27/11	OP49395	EZ3361

	Initial Weight	Final Volume
Run #1	35.0 g	1.0 ml
Run #2	35.0 g	1.0 ml

ABN TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
95-57-8	2-Chlorophenol	ND	370	76	ug/kg	
59-50-7	4-Chloro-3-methyl phenol	ND	370	75	ug/kg	
120-83-2	2,4-Dichlorophenol	ND	370	120	ug/kg	
105-67-9	2,4-Dimethylphenol	ND	370	130	ug/kg	
51-28-5	2,4-Dinitrophenol	ND	1500	91	ug/kg	
534-52-1	4,6-Dinitro-o-cresol	ND	1500	91	ug/kg	
95-48-7	2-Methylphenol	ND	150	85	ug/kg	
	3&4-Methylphenol	ND	150	95	ug/kg	
88-75-5	2-Nitrophenol	ND	370	79	ug/kg	
100-02-7	4-Nitrophenol	ND	750	130	ug/kg	
87-86-5	Pentachlorophenol	ND	750	130	ug/kg	
108-95-2	Phenol	ND	150	79	ug/kg	
58-90-2	2,3,4,6-Tetrachlorophenol	ND	370	77	ug/kg	
95-95-4	2,4,5-Trichlorophenol	ND	370	87	ug/kg	
88-06-2	2,4,6-Trichlorophenol	ND	370	70	ug/kg	
83-32-9	Acenaphthene	2350	75	22	ug/kg	
208-96-8	Acenaphthylene	ND	75	24	ug/kg	
98-86-2	Acetophenone	ND	370	13	ug/kg	
120-12-7	Anthracene	754	75	26	ug/kg	
1912-24-9	Atrazine	ND	370	15	ug/kg	
56-55-3	Benzo(a)anthracene	224	75	24	ug/kg	
50-32-8	Benzo(a)pyrene	233	75	23	ug/kg	
205-99-2	Benzo(b)fluoranthene	220	75	25	ug/kg	
191-24-2	Benzo(g,h,i)perylene	85.3	75	28	ug/kg	
207-08-9	Benzo(k)fluoranthene	91.3	75	28	ug/kg	
101-55-3	4-Bromophenyl phenyl ether	ND	150	27	ug/kg	
85-68-7	Butyl benzyl phthalate	ND	150	43	ug/kg	
92-52-4	1,1'-Biphenyl	ND	150	8.7	ug/kg	
100-52-7	Benzaldehyde	ND	370	17	ug/kg	
91-58-7	2-Chloronaphthalene	ND	150	23	ug/kg	
106-47-8	4-Chloroaniline	ND	370	24	ug/kg	
86-74-8	Carbazole	ND	150	35	ug/kg	

ND = Not detected MDL - Method Detection Limit J = Indicates an estimated value
RL = Reporting Limit B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	WC-2		
Lab Sample ID:	JA74026-2	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	SW846 8270C SW846 3550B	**Percent Solids:**	76.4
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

ABN TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
105-60-2	Caprolactam	ND	150	24	ug/kg	
218-01-9	Chrysene	1200	75	25	ug/kg	
111-91-1	bis(2-Chloroethoxy)methane	ND	150	30	ug/kg	
111-44-4	bis(2-Chloroethyl)ether	ND	150	23	ug/kg	
108-60-1	bis(2-Chloroisopropyl)ether	ND	150	22	ug/kg	
7005-72-3	4-Chlorophenyl phenyl ether	ND	150	23	ug/kg	
121-14-2	2,4-Dinitrotoluene	ND	150	33	ug/kg	
606-20-2	2,6-Dinitrotoluene	ND	150	28	ug/kg	
91-94-1	3,3'-Dichlorobenzidine	ND	370	19	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	45.3	75	26	ug/kg	J
132-64-9	Dibenzofuran	999	150	22	ug/kg	
84-74-2	Di-n-butyl phthalate	ND	150	17	ug/kg	
117-84-0	Di-n-octyl phthalate	ND	150	36	ug/kg	
84-66-2	Diethyl phthalate	ND	150	26	ug/kg	
131-11-3	Dimethyl phthalate	ND	150	26	ug/kg	
117-81-7	bis(2-Ethylhexyl)phthalate	872	150	66	ug/kg	
206-44-0	Fluoranthene	444	75	33	ug/kg	
86-73-7	Fluorene	3800	75	25	ug/kg	
118-74-1	Hexachlorobenzene	ND	150	24	ug/kg	
87-68-3	Hexachlorobutadiene	ND	75	21	ug/kg	
77-47-4	Hexachlorocyclopentadiene	ND	1500	76	ug/kg	
67-72-1	Hexachloroethane	ND	370	21	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	64.4	75	26	ug/kg	J
78-59-1	Isophorone	ND	150	20	ug/kg	
91-57-6	2-Methylnaphthalene	ND	150	42	ug/kg	
88-74-4	2-Nitroaniline	ND	370	33	ug/kg	
99-09-2	3-Nitroaniline	ND	370	30	ug/kg	
100-01-6	4-Nitroaniline	ND	370	29	ug/kg	
91-20-3	Naphthalene	880	75	20	ug/kg	
98-95-3	Nitrobenzene	ND	150	22	ug/kg	
621-64-7	N-Nitroso-di-n-propylamine	ND	150	18	ug/kg	
86-30-6	N-Nitrosodiphenylamine	ND	370	45	ug/kg	
85-01-8	Phenanthrene	5750	75	34	ug/kg	
129-00-0	Pyrene	1790	75	29	ug/kg	
95-94-3	1,2,4,5-Tetrachlorobenzene	ND	370	23	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	65%	60%	21-116%
4165-62-2	Phenol-d5	68%	61%	19-117%

ND = Not detected MDL - Method Detection Limit J = Indicates an estimated value
RL = Reporting Limit B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	WC-2		
Lab Sample ID:	JA74026-2	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	SW846 8270C SW846 3550B	**Percent Solids:**	76.4
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

ABN TCL List (SOM0 1.1)

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
118-79-6	2,4,6-Tribromophenol	63%	27%	24-136%
4165-60-0	Nitrobenzene-d5	82%	71%	21-122%
321-60-8	2-Fluorobiphenyl	70%	81%	30-117%
1718-51-0	Terphenyl-d14	63%	69%	31-129%

CAS No.	Tentatively Identified Compounds	R.T.	Est. Conc.	Units	Q
	system artifact	2.71	4400	ug/kg	J
	alkane	6.78	5600	ug/kg	J
	cycloalkane/alkene	7.08	4400	ug/kg	J
	alkane	7.35	14000	ug/kg	J
	unknown	7.65	4800	ug/kg	J
	unknown	7.75	4600	ug/kg	J
90-12-0	Naphthalene, 1-methyl-	7.87	9100	ug/kg	JN
	alkene	8.05	3600	ug/kg	J
	Naphthalene dimethyl	8.72	8700	ug/kg	J
	Naphthalene dimethyl	8.86	9800	ug/kg	J
	alkane	9.05	26000	ug/kg	J
	Naphthalene dimethyl	9.17	5000	ug/kg	J
	unknown	9.21	5500	ug/kg	J
	Naphthalene trimethyl	9.57	6700	ug/kg	J
	Naphthalene trimethyl	9.75	5300	ug/kg	J
	Naphthalene trimethyl	9.80	14000	ug/kg	J
	Naphthalene trimethyl	9.93	4200	ug/kg	J
	Naphthalene trimethyl	9.97	4400	ug/kg	J
	Naphthalene trimethyl	10.07	6300	ug/kg	J
	unknown	10.41	5300	ug/kg	J
	unknown	10.47	4300	ug/kg	J
	unknown	10.54	14000	ug/kg	J
	alkane	11.00	3800	ug/kg	J
	unknown	13.57	4900	ug/kg	J
	unknown	13.65	4200	ug/kg	J
	unknown	13.87	9500	ug/kg	J
	Total TIC, Semi-Volatile		188000	ug/kg	J

(a) Dilution required due to viscosity of extract matrix
(b) Confirmation run for internal standard areas.

ND = Not detected MDL - Method Detection Limit J = Indicates an estimated value
RL = Reporting Limit B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	WC-2		
Lab Sample ID:	JA74026-2	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	SW846 8082 SW846 3545	**Percent Solids:**	76.4
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	XX106806.D	1	04/29/11	AZ	04/27/11	OP49392	GXX4046
Run #2							

	Initial Weight	Final Volume
Run #1	17.0 g	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	38	14	ug/kg	
11104-28-2	Aroclor 1221	ND	38	25	ug/kg	
11141-16-5	Aroclor 1232	ND	38	12	ug/kg	
53469-21-9	Aroclor 1242	ND	38	14	ug/kg	
12672-29-6	Aroclor 1248	ND	38	7.6	ug/kg	
11097-69-1	Aroclor 1254 [a]	535	38	9.7	ug/kg	
11096-82-5	Aroclor 1260	ND	38	15	ug/kg	
11100-14-4	Aroclor 1268	ND	38	8.7	ug/kg	
37324-23-5	Aroclor 1262	ND	38	7.8	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	66%		22-141%
877-09-8	Tetrachloro-m-xylene	102%		22-141%
2051-24-3	Decachlorobiphenyl	72%		18-163%
2051-24-3	Decachlorobiphenyl	101%		18-163%

(a) Reported from 2nd signal. %D of end check (ECC) on 1st signal excess method criteria (15 %) so using for confirmation only.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	WC-2		
Lab Sample ID:	JA74026-2	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
		Percent Solids:	76.4
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

Metals Analysis, TCLP Leachate SW846 1311

Analyte	Result	HW#	MCL	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Arsenic	< 0.50	D004	5.0	0.50	mg/l	1	04/29/11	05/02/11	ND	SW846 6010B [1]	SW846 3010A [3]
Barium	< 1.0	D005	100	1.0	mg/l	1	04/29/11	05/02/11	ND	SW846 6010B [1]	SW846 3010A [3]
Cadmium	< 0.0050	D006	1.0	0.0050	mg/l	1	04/29/11	05/02/11	ND	SW846 6010B [1]	SW846 3010A [3]
Chromium	0.21	D007	5.0	0.010	mg/l	1	04/29/11	05/02/11	ND	SW846 6010B [1]	SW846 3010A [3]
Lead	< 0.50	D008	5.0	0.50	mg/l	1	04/29/11	05/02/11	ND	SW846 6010B [1]	SW846 3010A [3]
Mercury	< 0.00020	D009	0.20	0.00020	mg/l	1	05/09/11	05/09/11	VK	SW846 7470A [2]	SW846 7470A [4]
Selenium	< 0.50	D010	1.0	0.50	mg/l	1	04/29/11	05/02/11	ND	SW846 6010B [1]	SW846 3010A [3]
Silver	< 0.010	D011	5.0	0.010	mg/l	1	04/29/11	05/02/11	ND	SW846 6010B [1]	SW846 3010A [3]

(1) Instrument QC Batch: MA26272
(2) Instrument QC Batch: MA26332
(3) Prep QC Batch: MP57937
(4) Prep QC Batch: MP57972

RL = Reporting Limit
MCL = Maximum Contamination Level (40 CFR 261 6/96)

Report of Analysis

Client Sample ID:	WC-2		
Lab Sample ID:	JA74026-2	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
		Percent Solids:	76.4
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Paint Filter Test [a]	< 0.50	0.50	ml/100g	1	04/28/11	LMM	SW846 9095B
Solids, Percent	76.4		%	1	05/06/11	JB	SM18 2540G

(a) No free liquids.

RL = Reporting Limit

Report of Analysis

Client Sample ID:	WC-2		
Lab Sample ID:	JA74026-2A	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
		Percent Solids:	76.4
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Antimony	6.3	2.5	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]
Arsenic	19.2	2.5	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]
Beryllium	1.6	0.25	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [2]	SW846 3050B [4]
Cadmium	1.7	0.64	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]
Chromium	962	1.3	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]
Copper	221	3.2	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]
Lead	172	2.5	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]
Mercury	1.1	0.076	mg/kg	2	05/09/11	05/09/11	JW	SW846 7471A [3]	SW846 7471A [5]
Nickel	53.6	5.1	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]
Selenium	< 2.5	2.5	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]
Silver	< 0.64	0.64	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]
Thallium	< 1.3	1.3	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]
Zinc	959	2.5	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]

(1) Instrument QC Batch: MA26318
(2) Instrument QC Batch: MA26321
(3) Instrument QC Batch: MA26329
(4) Prep QC Batch: MP58049
(5) Prep QC Batch: MP58105

RL = Reporting Limit

Report of Analysis

Client Sample ID:	WC-3		
Lab Sample ID:	JA74026-3	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	SW846 8260B SW846 5035	**Percent Solids:**	75.5
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	D181524.D	1	04/29/11	MAH	04/26/11 09:00	n/a	VD7371
Run #2							

	Initial Weight	Final Volume	Methanol Aliquot
Run #1	4.2 g	5.0 ml	100 ul
Run #2			

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	950	210	ug/kg	
71-43-2	Benzene	ND	95	32	ug/kg	
74-97-5	Bromochloromethane	ND	480	21	ug/kg	
75-27-4	Bromodichloromethane	ND	480	24	ug/kg	
75-25-2	Bromoform	ND	480	14	ug/kg	
74-83-9	Bromomethane	ND	480	38	ug/kg	
78-93-3	2-Butanone (MEK)	ND	950	190	ug/kg	
75-15-0	Carbon disulfide	ND	480	29	ug/kg	
56-23-5	Carbon tetrachloride	ND	480	53	ug/kg	
108-90-7	Chlorobenzene	ND	480	32	ug/kg	
75-00-3	Chloroethane	ND	480	95	ug/kg	
67-66-3	Chloroform	ND	480	30	ug/kg	
74-87-3	Chloromethane	ND	480	16	ug/kg	
110-82-7	Cyclohexane	118	480	14	ug/kg	J
96-12-8	1,2-Dibromo-3-chloropropane	ND	950	51	ug/kg	
124-48-1	Dibromochloromethane	ND	480	10	ug/kg	
106-93-4	1,2-Dibromoethane	ND	95	13	ug/kg	
95-50-1	1,2-Dichlorobenzene	ND	480	26	ug/kg	
541-73-1	1,3-Dichlorobenzene	ND	480	26	ug/kg	
106-46-7	1,4-Dichlorobenzene	ND	480	32	ug/kg	
75-71-8	Dichlorodifluoromethane	ND	480	90	ug/kg	
75-34-3	1,1-Dichloroethane	ND	480	13	ug/kg	
107-06-2	1,2-Dichloroethane	ND	95	33	ug/kg	
75-35-4	1,1-Dichloroethene	ND	480	63	ug/kg	
156-59-2	cis-1,2-Dichloroethene	ND	480	23	ug/kg	
156-60-5	trans-1,2-Dichloroethene	ND	480	43	ug/kg	
78-87-5	1,2-Dichloropropane	ND	480	12	ug/kg	
10061-01-5	cis-1,3-Dichloropropene	ND	480	13	ug/kg	
10061-02-6	trans-1,3-Dichloropropene	ND	480	9.1	ug/kg	
123-91-1	1,4-Dioxane	ND	12000	8200	ug/kg	
100-41-4	Ethylbenzene	119	95	35	ug/kg	
76-13-1	Freon 113	ND	480	53	ug/kg	

ND = Not detected MDL - Method Detection Limit J = Indicates an estimated value
RL = Reporting Limit B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	WC-3		
Lab Sample ID:	JA74026-3	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	SW846 8260B SW846 5035	**Percent Solids:**	75.5
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
591-78-6	2-Hexanone	ND	480	92	ug/kg	
98-82-8	Isopropylbenzene	ND	480	49	ug/kg	
79-20-9	Methyl Acetate	104	480	78	ug/kg	J
108-87-2	Methylcyclohexane	429	480	62	ug/kg	J
1634-04-4	Methyl Tert Butyl Ether	ND	95	27	ug/kg	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	480	77	ug/kg	
75-09-2	Methylene chloride	ND	480	21	ug/kg	
100-42-5	Styrene	ND	480	10	ug/kg	
75-65-0	Tert Butyl Alcohol	ND	2400	1400	ug/kg	
79-34-5	1,1,2,2-Tetrachloroethane	ND	480	28	ug/kg	
127-18-4	Tetrachloroethene	ND	480	14	ug/kg	
108-88-3	Toluene	ND	95	28	ug/kg	
87-61-6	1,2,3-Trichlorobenzene	ND	480	56	ug/kg	
120-82-1	1,2,4-Trichlorobenzene	ND	480	33	ug/kg	
71-55-6	1,1,1-Trichloroethane	ND	480	12	ug/kg	
79-00-5	1,1,2-Trichloroethane	ND	480	18	ug/kg	
79-01-6	Trichloroethene	ND	480	50	ug/kg	
75-69-4	Trichlorofluoromethane	ND	480	22	ug/kg	
75-01-4	Vinyl chloride	ND	480	17	ug/kg	
	m,p-Xylene	45.4	190	45	ug/kg	J
95-47-6	o-Xylene	62.0	95	45	ug/kg	J
1330-20-7	Xylene (total)	107	190	45	ug/kg	J

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	97%		67-131%
17060-07-0	1,2-Dichloroethane-D4	107%		66-130%
2037-26-5	Toluene-D8	104%		76-125%
460-00-4	4-Bromofluorobenzene	105%		53-142%

CAS No.	Tentatively Identified Compounds	R.T.	Est. Conc.	Units	Q
	alkane	11.90	1900	ug/kg	J
	cycloalkane/alkene	13.49	2500	ug/kg	J
	alkane	14.93	2900	ug/kg	J
	cycloalkane/alkene	15.54	2300	ug/kg	J
	cycloalkane/alkene	16.44	1700	ug/kg	J
	Naphthalene decahydro	17.06	4000	ug/kg	J
	C4 alkyl benzene	17.33	2500	ug/kg	J
	C4 alkyl benzene	17.50	2100	ug/kg	J

ND = Not detected MDL - Method Detection Limit J = Indicates an estimated value
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E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	WC-3		
Lab Sample ID:	JA74026-3	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	SW846 8260B SW846 5035	**Percent Solids:**	75.5
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

VOA TCL List (SOM0 1.1)

CAS No.	Tentatively Identified Compounds	R.T.	Est. Conc.	Units	Q
	ketones	17.75	4000	ug/kg	J
	unknown	17.99	3400	ug/kg	J
	C5 alkyl benzene	18.07	2200	ug/kg	J
	C5 alkyl benzene	18.68	2200	ug/kg	J
	C5 alkyl benzene	18.84	3100	ug/kg	J
	C6 alkyl benzene	19.21	4200	ug/kg	J
	C6 alkyl benzene	19.64	1800	ug/kg	J
	Total TIC, Volatile		40800	ug/kg	J

(a) Dilution required due to matrix interference.

ND = Not detected   MDL - Method Detection Limit   J = Indicates an estimated value
RL = Reporting Limit   B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range   N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	WC-3		
Lab Sample ID:	JA74026-3	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	SW846 8270C SW846 3550B	**Percent Solids:**	75.5
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	Z63119.D	2	04/29/11	KLS	04/27/11	OP49395	EZ3351
Run #2							

	Initial Weight	Final Volume
Run #1	35.1 g	1.0 ml
Run #2		

ABN TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
95-57-8	2-Chlorophenol	ND	380	76	ug/kg	
59-50-7	4-Chloro-3-methyl phenol	ND	380	75	ug/kg	
120-83-2	2,4-Dichlorophenol	ND	380	120	ug/kg	
105-67-9	2,4-Dimethylphenol	ND	380	130	ug/kg	
51-28-5	2,4-Dinitrophenol	ND	1500	92	ug/kg	
534-52-1	4,6-Dinitro-o-cresol	ND	1500	92	ug/kg	
95-48-7	2-Methylphenol	ND	150	86	ug/kg	
	3&4-Methylphenol	ND	150	96	ug/kg	
88-75-5	2-Nitrophenol	ND	380	80	ug/kg	
100-02-7	4-Nitrophenol	ND	750	130	ug/kg	
87-86-5	Pentachlorophenol	ND	750	130	ug/kg	
108-95-2	Phenol	ND	150	79	ug/kg	
58-90-2	2,3,4,6-Tetrachlorophenol	ND	380	78	ug/kg	
95-95-4	2,4,5-Trichlorophenol	ND	380	88	ug/kg	
88-06-2	2,4,6-Trichlorophenol	ND	380	71	ug/kg	
83-32-9	Acenaphthene	1010	75	22	ug/kg	
208-96-8	Acenaphthylene	ND	75	24	ug/kg	
98-86-2	Acetophenone	ND	380	13	ug/kg	
120-12-7	Anthracene	496	75	26	ug/kg	
1912-24-9	Atrazine	ND	380	15	ug/kg	
56-55-3	Benzo(a)anthracene	424	75	25	ug/kg	
50-32-8	Benzo(a)pyrene	262	75	23	ug/kg	
205-99-2	Benzo(b)fluoranthene	142	75	25	ug/kg	
191-24-2	Benzo(g,h,i)perylene	86.0	75	28	ug/kg	
207-08-9	Benzo(k)fluoranthene	61.5	75	28	ug/kg	J
101-55-3	4-Bromophenyl phenyl ether	ND	150	27	ug/kg	
85-68-7	Butyl benzyl phthalate	ND	150	44	ug/kg	
92-52-4	1,1'-Biphenyl	ND	150	8.8	ug/kg	
100-52-7	Benzaldehyde	ND	380	17	ug/kg	
91-58-7	2-Chloronaphthalene	ND	150	23	ug/kg	
106-47-8	4-Chloroaniline	ND	380	24	ug/kg	
86-74-8	Carbazole	ND	150	35	ug/kg	

ND = Not detected MDL - Method Detection Limit J = Indicates an estimated value
RL = Reporting Limit B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	WC-3		
Lab Sample ID:	JA74026-3	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	SW846 8270C SW846 3550B	**Percent Solids:**	75.5
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

ABN TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
105-60-2	Caprolactam	ND	150	24	ug/kg	
218-01-9	Chrysene	898	75	26	ug/kg	
111-91-1	bis(2-Chloroethoxy)methane	ND	150	30	ug/kg	
111-44-4	bis(2-Chloroethyl)ether	ND	150	23	ug/kg	
108-60-1	bis(2-Chloroisopropyl)ether	ND	150	22	ug/kg	
7005-72-3	4-Chlorophenyl phenyl ether	ND	150	23	ug/kg	
121-14-2	2,4-Dinitrotoluene	ND	150	33	ug/kg	
606-20-2	2,6-Dinitrotoluene	ND	150	29	ug/kg	
91-94-1	3,3'-Dichlorobenzidine	ND	380	19	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	ND	75	26	ug/kg	
132-64-9	Dibenzofuran	575	150	22	ug/kg	
84-74-2	Di-n-butyl phthalate	ND	150	17	ug/kg	
117-84-0	Di-n-octyl phthalate	ND	150	37	ug/kg	
84-66-2	Diethyl phthalate	ND	150	26	ug/kg	
131-11-3	Dimethyl phthalate	ND	150	27	ug/kg	
117-81-7	bis(2-Ethylhexyl)phthalate	664	150	67	ug/kg	
206-44-0	Fluoranthene	303	75	33	ug/kg	
86-73-7	Fluorene	2080	75	25	ug/kg	
118-74-1	Hexachlorobenzene	ND	150	25	ug/kg	
87-68-3	Hexachlorobutadiene	ND	75	21	ug/kg	
77-47-4	Hexachlorocyclopentadiene	ND	1500	77	ug/kg	
67-72-1	Hexachloroethane	ND	380	21	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	57.5	75	26	ug/kg	J
78-59-1	Isophorone	ND	150	20	ug/kg	
91-57-6	2-Methylnaphthalene	ND	150	42	ug/kg	
88-74-4	2-Nitroaniline	ND	380	33	ug/kg	
99-09-2	3-Nitroaniline	ND	380	30	ug/kg	
100-01-6	4-Nitroaniline	ND	380	29	ug/kg	
91-20-3	Naphthalene	531	75	21	ug/kg	
98-95-3	Nitrobenzene	ND	150	22	ug/kg	
621-64-7	N-Nitroso-di-n-propylamine	ND	150	18	ug/kg	
86-30-6	N-Nitrosodiphenylamine	ND	380	45	ug/kg	
85-01-8	Phenanthrene	3450	75	34	ug/kg	
129-00-0	Pyrene	1160	75	29	ug/kg	
95-94-3	1,2,4,5-Tetrachlorobenzene	ND	380	23	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	68%		21-116%
4165-62-2	Phenol-d5	74%		19-117%

ND = Not detected MDL - Method Detection Limit J = Indicates an estimated value
RL = Reporting Limit B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	WC-3		
Lab Sample ID:	JA74026-3	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	SW846 8270C SW846 3550B	**Percent Solids:**	75.5
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

ABN TCL List (SOM0 1.1)

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
118-79-6	2,4,6-Tribromophenol	62%		24-136%
4165-60-0	Nitrobenzene-d5	78%		21-122%
321-60-8	2-Fluorobiphenyl	63%		30-117%
1718-51-0	Terphenyl-d14	62%		31-129%

CAS No.	Tentatively Identified Compounds	R.T.	Est. Conc.	Units	Q
	system artifact	2.71	8600	ug/kg	J
	alkane	6.77	4900	ug/kg	J
	cycloalkane/alkene	7.07	3800	ug/kg	J
	alkane	7.33	11000	ug/kg	J
	1H-indene-dihydro-trimethyl	7.64	3500	ug/kg	J
	unknown	7.74	3700	ug/kg	J
90-12-0	Naphthalene, 1-methyl-	7.87	6500	ug/kg	JN
	alkene	8.04	4300	ug/kg	J
	unknown	8.40	5100	ug/kg	J
	Naphthalene dimethyl	8.70	7600	ug/kg	J
	Naphthalene dimethyl	8.85	9200	ug/kg	J
	Naphthalene dimethyl	8.88	6200	ug/kg	J
	alkane	9.03	27000	ug/kg	J
	unknown	9.20	5300	ug/kg	J
	Naphthalene trimethyl	9.55	7400	ug/kg	J
	Naphthalene trimethyl	9.74	4600	ug/kg	J
	Naphthalene trimethyl	9.79	13000	ug/kg	J
	Naphthalene trimethyl	9.92	5000	ug/kg	J
	Naphthalene trimethyl	9.95	4500	ug/kg	J
	Naphthalene trimethyl	10.06	6700	ug/kg	J
	unknown	10.39	4600	ug/kg	J
	unknown	10.45	4500	ug/kg	J
	alkane	10.53	15000	ug/kg	J
	alkane	10.98	3900	ug/kg	J
	unknown	13.57	4400	ug/kg	J
	unknown	13.86	8100	ug/kg	J
	Total TIC, Semi-Volatile		179800	ug/kg	J

(a) Dilution required due to viscosity of extract matrix

ND = Not detected MDL - Method Detection Limit J = Indicates an estimated value
RL = Reporting Limit B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	WC-3		
Lab Sample ID:	JA74026-3	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	SW846 8082 SW846 3545	**Percent Solids:**	75.5
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	XX106807.D	1	04/29/11	AZ	04/27/11	OP49392	GXX4046
Run #2							

	Initial Weight	Final Volume
Run #1	17.0 g	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	39	14	ug/kg	
11104-28-2	Aroclor 1221	ND	39	26	ug/kg	
11141-16-5	Aroclor 1232	ND	39	13	ug/kg	
53469-21-9	Aroclor 1242	ND	39	14	ug/kg	
12672-29-6	Aroclor 1248	ND	39	7.7	ug/kg	
11097-69-1	Aroclor 1254	439	39	9.8	ug/kg	
11096-82-5	Aroclor 1260	ND	39	15	ug/kg	
11100-14-4	Aroclor 1268	ND	39	8.8	ug/kg	
37324-23-5	Aroclor 1262	ND	39	7.9	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	85%		22-141%
877-09-8	Tetrachloro-m-xylene	106%		22-141%
2051-24-3	Decachlorobiphenyl	78%		18-163%
2051-24-3	Decachlorobiphenyl	95%		18-163%

ND = Not detected MDL - Method Detection Limit J = Indicates an estimated value
RL = Reporting Limit B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	WC-3		
Lab Sample ID:	JA74026-3	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
		Percent Solids:	75.5
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

Metals Analysis, TCLP Leachate SW846 1311

Analyte	Result	HW#	MCL	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Arsenic	< 0.50	D004	5.0	0.50	mg/l	1	04/29/11	05/02/11	ND	SW846 6010B [1]	SW846 3010A [3]
Barium	< 1.0	D005	100	1.0	mg/l	1	04/29/11	05/02/11	ND	SW846 6010B [1]	SW846 3010A [3]
Cadmium	< 0.0050	D006	1.0	0.0050	mg/l	1	04/29/11	05/02/11	ND	SW846 6010B [1]	SW846 3010A [3]
Chromium	0.25	D007	5.0	0.010	mg/l	1	04/29/11	05/02/11	ND	SW846 6010B [1]	SW846 3010A [3]
Lead	< 0.50	D008	5.0	0.50	mg/l	1	04/29/11	05/02/11	ND	SW846 6010B [1]	SW846 3010A [3]
Mercury	< 0.00020	D009	0.20	0.00020	mg/l	1	05/09/11	05/09/11	VK	SW846 7470A [2]	SW846 7470A [4]
Selenium	< 0.50	D010	1.0	0.50	mg/l	1	04/29/11	05/02/11	ND	SW846 6010B [1]	SW846 3010A [3]
Silver	< 0.010	D011	5.0	0.010	mg/l	1	04/29/11	05/02/11	ND	SW846 6010B [1]	SW846 3010A [3]

(1) Instrument QC Batch: MA26272
(2) Instrument QC Batch: MA26332
(3) Prep QC Batch: MP57937
(4) Prep QC Batch: MP57972

RL = Reporting Limit
MCL = Maximum Contamination Level (40 CFR 261 6/96)

Report of Analysis

Client Sample ID:	WC-3		
Lab Sample ID:	JA74026-3	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
		Percent Solids:	75.5
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Paint Filter Test [a]	< 0.50	0.50	ml/100g	1	04/28/11	LMM	SW846 9095B
Solids, Percent	75.5		%	1	05/06/11	JB	SM18 2540G

(a) No free liquids.

RL = Reporting Limit

Report of Analysis

Client Sample ID:	WC-3		
Lab Sample ID:	JA74026-3A	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
		Percent Solids:	75.5
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Antimony	4.9	2.6	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]
Arsenic	16.8	2.6	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]
Beryllium	0.67	0.26	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [2]	SW846 3050B [4]
Cadmium	1.5	0.65	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]
Chromium	771	1.3	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]
Copper	135	3.2	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]
Lead	114	2.6	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]
Mercury	1.0	0.079	mg/kg	2	05/09/11	05/09/11	JW	SW846 7471A [3]	SW846 7471A [5]
Nickel	39.3	5.2	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]
Selenium	< 2.6	2.6	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]
Silver	< 0.65	0.65	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]
Thallium	< 1.3	1.3	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]
Zinc	512	2.6	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]

(1) Instrument QC Batch: MA26318
(2) Instrument QC Batch: MA26321
(3) Instrument QC Batch: MA26329
(4) Prep QC Batch: MP58049
(5) Prep QC Batch: MP58105

RL = Reporting Limit

Report of Analysis

Client Sample ID:	WC-4		
Lab Sample ID:	JA74026-4	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	SW846 8260B SW846 5035	**Percent Solids:**	74.9
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	X113917.D	1	04/26/11	JTP	04/26/11 09:00	n/a	VX4832
Run #2							

	Initial Weight
Run #1	5.3 g
Run #2	

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	24.0	13	2.8	ug/kg	
71-43-2	Benzene	1.9	1.3	0.43	ug/kg	
74-97-5	Bromochloromethane	ND	6.3	0.28	ug/kg	
75-27-4	Bromodichloromethane	ND	6.3	0.32	ug/kg	
75-25-2	Bromoform	ND	6.3	0.19	ug/kg	
74-83-9	Bromomethane	ND	6.3	0.51	ug/kg	
78-93-3	2-Butanone (MEK)	ND	13	2.5	ug/kg	
75-15-0	Carbon disulfide	ND	6.3	0.38	ug/kg	
56-23-5	Carbon tetrachloride	ND	6.3	0.70	ug/kg	
108-90-7	Chlorobenzene	ND	6.3	0.43	ug/kg	
75-00-3	Chloroethane	ND	6.3	1.3	ug/kg	
67-66-3	Chloroform	ND	6.3	0.40	ug/kg	
74-87-3	Chloromethane	ND	6.3	0.21	ug/kg	
110-82-7	Cyclohexane	1.9	6.3	0.19	ug/kg	J
96-12-8	1,2-Dibromo-3-chloropropane	ND	13	0.68	ug/kg	
124-48-1	Dibromochloromethane	ND	6.3	0.14	ug/kg	
106-93-4	1,2-Dibromoethane	ND	1.3	0.17	ug/kg	
95-50-1	1,2-Dichlorobenzene	ND	6.3	0.34	ug/kg	
541-73-1	1,3-Dichlorobenzene	ND	6.3	0.35	ug/kg	
106-46-7	1,4-Dichlorobenzene	ND	6.3	0.42	ug/kg	
75-71-8	Dichlorodifluoromethane	ND	6.3	1.2	ug/kg	
75-34-3	1,1-Dichloroethane	ND	6.3	0.17	ug/kg	
107-06-2	1,2-Dichloroethane	ND	1.3	0.43	ug/kg	
75-35-4	1,1-Dichloroethene	ND	6.3	0.83	ug/kg	
156-59-2	cis-1,2-Dichloroethene	ND	6.3	0.30	ug/kg	
156-60-5	trans-1,2-Dichloroethene	ND	6.3	0.57	ug/kg	
78-87-5	1,2-Dichloropropane	ND	6.3	0.16	ug/kg	
10061-01-5	cis-1,3-Dichloropropene	ND	6.3	0.17	ug/kg	
10061-02-6	trans-1,3-Dichloropropene	ND	6.3	0.12	ug/kg	
123-91-1	1,4-Dioxane	ND	160	110	ug/kg	
100-41-4	Ethylbenzene	1.9	1.3	0.47	ug/kg	
76-13-1	Freon 113	ND	6.3	0.71	ug/kg	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	WC-4		
Lab Sample ID:	JA74026-4	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	SW846 8260B SW846 5035	**Percent Solids:**	74.9
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
591-78-6	2-Hexanone	ND	6.3	1.2	ug/kg	
98-82-8	Isopropylbenzene	ND	6.3	0.65	ug/kg	
79-20-9	Methyl Acetate	ND	6.3	1.0	ug/kg	
108-87-2	Methylcyclohexane	3.7	6.3	0.82	ug/kg	J
1634-04-4	Methyl Tert Butyl Ether	ND	1.3	0.36	ug/kg	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	6.3	1.0	ug/kg	
75-09-2	Methylene chloride	ND	6.3	0.28	ug/kg	
100-42-5	Styrene	ND	6.3	0.13	ug/kg	
75-65-0	Tert Butyl Alcohol	ND	31	18	ug/kg	
79-34-5	1,1,2,2-Tetrachloroethane	ND	6.3	0.37	ug/kg	
127-18-4	Tetrachloroethene	ND	6.3	0.18	ug/kg	
108-88-3	Toluene	ND	1.3	0.37	ug/kg	
87-61-6	1,2,3-Trichlorobenzene	ND	6.3	0.74	ug/kg	
120-82-1	1,2,4-Trichlorobenzene	ND	6.3	0.43	ug/kg	
71-55-6	1,1,1-Trichloroethane	ND	6.3	0.16	ug/kg	
79-00-5	1,1,2-Trichloroethane	ND	6.3	0.23	ug/kg	
79-01-6	Trichloroethene	ND	6.3	0.66	ug/kg	
75-69-4	Trichlorofluoromethane	ND	6.3	0.29	ug/kg	
75-01-4	Vinyl chloride	ND	6.3	0.22	ug/kg	
	m,p-Xylene	0.64	2.5	0.59	ug/kg	J
95-47-6	o-Xylene	ND	1.3	0.59	ug/kg	
1330-20-7	Xylene (total)	1.0	2.5	0.59	ug/kg	J

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	112%		67-131%
17060-07-0	1,2-Dichloroethane-D4	114%		66-130%
2037-26-5	Toluene-D8	102%		76-125%
460-00-4	4-Bromofluorobenzene	118%		53-142%

CAS No.	Tentatively Identified Compounds	R.T.	Est. Conc.	Units	Q
	cycloalkane/alkene	14.66	31	ug/kg	J
	alkane	16.41	42	ug/kg	J
	cycloalkane/alkene	17.06	32	ug/kg	J
	Naphthalene decahydro	18.54	32	ug/kg	J
	unknown	19.13	43	ug/kg	J
	Naphthalene tetrahydro-methyl	19.35	51	ug/kg	J
	alkane	19.41	29	ug/kg	J
	alkane	19.59	99	ug/kg	J

ND = Not detected MDL - Method Detection Limit J = Indicates an estimated value
RL = Reporting Limit B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	WC-4		
Lab Sample ID:	JA74026-4	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	SW846 8260B SW846 5035	**Percent Solids:**	74.9
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

VOA TCL List (SOM0 1.1)

CAS No.	Tentatively Identified Compounds	R.T.	Est. Conc.	Units	Q
	alkane	19.68	44	ug/kg	J
	alkane	20.14	140	ug/kg	J
	unknown	20.37	33	ug/kg	J
	alkane	20.47	120	ug/kg	J
	unknown	20.69	35	ug/kg	J
	Naphthalene, methyl-	21.79	36	ug/kg	J
	unknown	22.03	36	ug/kg	J
	Total TIC, Volatile		803	ug/kg	J

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	WC-4			
Lab Sample ID:	JA74026-4		**Date Sampled:**	04/25/11
Matrix:	SO - Soil		**Date Received:**	04/25/11
Method:	SW846 8270C SW846 3550B		**Percent Solids:**	74.9
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ			

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	Z63120.D	2	04/29/11	KLS	04/27/11	OP49395	EZ3351
Run #2							

	Initial Weight	Final Volume
Run #1	35.1 g	1.0 ml
Run #2		

ABN TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
95-57-8	2-Chlorophenol	ND	380	77	ug/kg	
59-50-7	4-Chloro-3-methyl phenol	ND	380	76	ug/kg	
120-83-2	2,4-Dichlorophenol	ND	380	120	ug/kg	
105-67-9	2,4-Dimethylphenol	ND	380	130	ug/kg	
51-28-5	2,4-Dinitrophenol	ND	1500	93	ug/kg	
534-52-1	4,6-Dinitro-o-cresol	ND	1500	93	ug/kg	
95-48-7	2-Methylphenol	ND	150	87	ug/kg	
	3&4-Methylphenol	ND	150	97	ug/kg	
88-75-5	2-Nitrophenol	ND	380	81	ug/kg	
100-02-7	4-Nitrophenol	ND	760	130	ug/kg	
87-86-5	Pentachlorophenol	ND	760	130	ug/kg	
108-95-2	Phenol	ND	150	80	ug/kg	
58-90-2	2,3,4,6-Tetrachlorophenol	ND	380	78	ug/kg	
95-95-4	2,4,5-Trichlorophenol	ND	380	88	ug/kg	
88-06-2	2,4,6-Trichlorophenol	ND	380	72	ug/kg	
83-32-9	Acenaphthene	1080	76	22	ug/kg	
208-96-8	Acenaphthylene	ND	76	24	ug/kg	
98-86-2	Acetophenone	ND	380	13	ug/kg	
120-12-7	Anthracene	591	76	27	ug/kg	
1912-24-9	Atrazine	ND	380	15	ug/kg	
56-55-3	Benzo(a)anthracene	389	76	25	ug/kg	
50-32-8	Benzo(a)pyrene	431	76	23	ug/kg	
205-99-2	Benzo(b)fluoranthene	235	76	25	ug/kg	
191-24-2	Benzo(g,h,i)perylene	87.0	76	28	ug/kg	
207-08-9	Benzo(k)fluoranthene	156	76	29	ug/kg	
101-55-3	4-Bromophenyl phenyl ether	ND	150	28	ug/kg	
85-68-7	Butyl benzyl phthalate	ND	150	44	ug/kg	
92-52-4	1,1'-Biphenyl	ND	150	8.8	ug/kg	
100-52-7	Benzaldehyde	ND	380	17	ug/kg	
91-58-7	2-Chloronaphthalene	ND	150	24	ug/kg	
106-47-8	4-Chloroaniline	ND	380	24	ug/kg	
86-74-8	Carbazole	ND	150	35	ug/kg	

ND = Not detected   MDL - Method Detection Limit   J = Indicates an estimated value
RL = Reporting Limit   B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range   N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	WC-4		
Lab Sample ID:	JA74026-4	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	SW846 8270C SW846 3550B	**Percent Solids:**	74.9
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

ABN TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
105-60-2	Caprolactam	ND	150	24	ug/kg	
218-01-9	Chrysene	1550	76	26	ug/kg	
111-91-1	bis(2-Chloroethoxy)methane	ND	150	31	ug/kg	
111-44-4	bis(2-Chloroethyl)ether	ND	150	23	ug/kg	
108-60-1	bis(2-Chloroisopropyl)ether	ND	150	23	ug/kg	
7005-72-3	4-Chlorophenyl phenyl ether	ND	150	23	ug/kg	
121-14-2	2,4-Dinitrotoluene	ND	150	33	ug/kg	
606-20-2	2,6-Dinitrotoluene	ND	150	29	ug/kg	
91-94-1	3,3'-Dichlorobenzidine	ND	380	19	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	52.4	76	26	ug/kg	J
132-64-9	Dibenzofuran	627	150	23	ug/kg	
84-74-2	Di-n-butyl phthalate	ND	150	17	ug/kg	
117-84-0	Di-n-octyl phthalate	ND	150	37	ug/kg	
84-66-2	Diethyl phthalate	ND	150	26	ug/kg	
131-11-3	Dimethyl phthalate	ND	150	27	ug/kg	
117-81-7	bis(2-Ethylhexyl)phthalate	1040	150	67	ug/kg	
206-44-0	Fluoranthene	479	76	34	ug/kg	
86-73-7	Fluorene	2080	76	25	ug/kg	
118-74-1	Hexachlorobenzene	ND	150	25	ug/kg	
87-68-3	Hexachlorobutadiene	ND	76	21	ug/kg	
77-47-4	Hexachlorocyclopentadiene	ND	1500	78	ug/kg	
67-72-1	Hexachloroethane	ND	380	21	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	75.5	76	26	ug/kg	J
78-59-1	Isophorone	ND	150	20	ug/kg	
91-57-6	2-Methylnaphthalene	ND	150	42	ug/kg	
88-74-4	2-Nitroaniline	ND	380	33	ug/kg	
99-09-2	3-Nitroaniline	ND	380	30	ug/kg	
100-01-6	4-Nitroaniline	ND	380	30	ug/kg	
91-20-3	Naphthalene	ND	76	21	ug/kg	
98-95-3	Nitrobenzene	ND	150	22	ug/kg	
621-64-7	N-Nitroso-di-n-propylamine	ND	150	19	ug/kg	
86-30-6	N-Nitrosodiphenylamine	ND	380	45	ug/kg	
85-01-8	Phenanthrene	2640	76	35	ug/kg	
129-00-0	Pyrene	1870	76	29	ug/kg	
95-94-3	1,2,4,5-Tetrachlorobenzene	ND	380	23	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	68%		21-116%
4165-62-2	Phenol-d5	70%		19-117%

ND = Not detected   MDL - Method Detection Limit   J = Indicates an estimated value
RL = Reporting Limit   B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range   N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	WC-4		
Lab Sample ID:	JA74026-4	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	SW846 8270C SW846 3550B	**Percent Solids:**	74.9
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

ABN TCL List (SOM0 1.1)

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
118-79-6	2,4,6-Tribromophenol	60%		24-136%
4165-60-0	Nitrobenzene-d5	75%		21-122%
321-60-8	2-Fluorobiphenyl	64%		30-117%
1718-51-0	Terphenyl-d14	62%		31-129%

CAS No.	Tentatively Identified Compounds	R.T.	Est. Conc.	Units	Q
	cycloalkane/alkene	7.07	4500	ug/kg	J
	alkane	7.34	16000	ug/kg	J
	unknown	7.64	4400	ug/kg	J
	unknown	7.74	4500	ug/kg	J
90-12-0	Naphthalene, 1-methyl-	7.87	5800	ug/kg	JN
	unknown	8.41	5200	ug/kg	J
	Naphthalene dimethyl	8.71	4600	ug/kg	J
	Naphthalene dimethyl	8.85	6200	ug/kg	J
	unknown	8.90	5400	ug/kg	J
	alkane	9.04	30000	ug/kg	J
	unknown	9.14	5700	ug/kg	J
	unknown	9.21	6500	ug/kg	J
	Naphthalene trimethyl	9.56	5300	ug/kg	J
	Naphthalene trimethyl	9.79	13000	ug/kg	J
	alkane	9.89	4400	ug/kg	J
	Naphthalene trimethyl	9.93	4900	ug/kg	J
	Naphthalene trimethyl	10.06	8200	ug/kg	J
	1,1'-Biphenyl-methyl-	10.40	5300	ug/kg	J
	unknown	10.46	4500	ug/kg	J
	alkane	10.55	20000	ug/kg	J
	alkane	13.53	5800	ug/kg	J
	unknown	13.58	8200	ug/kg	J
	unknown	13.65	5900	ug/kg	J
	unknown	13.87	15000	ug/kg	J
	unknown	14.09	4700	ug/kg	J
	Total TIC, Semi-Volatile		204000	ug/kg	J

(a) Dilution required due to viscosity of extract matrix

ND = Not detected MDL - Method Detection Limit J = Indicates an estimated value
RL = Reporting Limit B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	WC-4		
Lab Sample ID:	JA74026-4	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	SW846 8082 SW846 3545	**Percent Solids:**	74.9
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	XX106808.D	1	04/29/11	AZ	04/27/11	OP49392	GXX4046
Run #2							

	Initial Weight	Final Volume
Run #1	17.0 g	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	39	14	ug/kg	
11104-28-2	Aroclor 1221	ND	39	26	ug/kg	
11141-16-5	Aroclor 1232	ND	39	13	ug/kg	
53469-21-9	Aroclor 1242	ND	39	14	ug/kg	
12672-29-6	Aroclor 1248	ND	39	7.8	ug/kg	
11097-69-1	Aroclor 1254 [a]	573	39	9.9	ug/kg	
11096-82-5	Aroclor 1260	ND	39	15	ug/kg	
11100-14-4	Aroclor 1268	ND	39	8.9	ug/kg	
37324-23-5	Aroclor 1262	ND	39	7.9	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	80%		22-141%
877-09-8	Tetrachloro-m-xylene	58%		22-141%
2051-24-3	Decachlorobiphenyl	71%		18-163%
2051-24-3	Decachlorobiphenyl	103%		18-163%

(a) Reported from 2nd signal. %D of end check (ECC) on 1st signal excess method criteria (15 %) so using for confirmation only.

ND = Not detected MDL - Method Detection Limit J = Indicates an estimated value
RL = Reporting Limit B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	WC-4		
Lab Sample ID:	JA74026-4	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
		Percent Solids:	74.9
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

Metals Analysis, TCLP Leachate SW846 1311

Analyte	Result	HW#	MCL	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Arsenic	< 0.50	D004	5.0	0.50	mg/l	1	04/29/11	05/02/11	ND	SW846 6010B [1]	SW846 3010A [3]
Barium	< 1.0	D005	100	1.0	mg/l	1	04/29/11	05/02/11	ND	SW846 6010B [1]	SW846 3010A [3]
Cadmium	< 0.0050	D006	1.0	0.0050	mg/l	1	04/29/11	05/02/11	ND	SW846 6010B [1]	SW846 3010A [3]
Chromium	0.20	D007	5.0	0.010	mg/l	1	04/29/11	05/02/11	ND	SW846 6010B [1]	SW846 3010A [3]
Lead	< 0.50	D008	5.0	0.50	mg/l	1	04/29/11	05/02/11	ND	SW846 6010B [1]	SW846 3010A [3]
Mercury	< 0.00020	D009	0.20	0.00020	mg/l	1	05/09/11	05/09/11	VK	SW846 7470A [2]	SW846 7470A [4]
Selenium	< 0.50	D010	1.0	0.50	mg/l	1	04/29/11	05/02/11	ND	SW846 6010B [1]	SW846 3010A [3]
Silver	< 0.010	D011	5.0	0.010	mg/l	1	04/29/11	05/02/11	ND	SW846 6010B [1]	SW846 3010A [3]

(1) Instrument QC Batch: MA26272
(2) Instrument QC Batch: MA26332
(3) Prep QC Batch: MP57937
(4) Prep QC Batch: MP57972

RL = Reporting Limit
MCL = Maximum Contamination Level (40 CFR 261 6/96)

Report of Analysis

Client Sample ID:	WC-4		
Lab Sample ID:	JA74026-4	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
		Percent Solids:	74.9
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Paint Filter Test [a]	< 0.50	0.50	ml/100g	1	04/28/11	LMM	SW846 9095B
Solids, Percent	74.9		%	1	05/06/11	JB	SM18 2540G

(a) No free liquids.

RL = Reporting Limit

Report of Analysis

Client Sample ID:	WC-4		
Lab Sample ID:	JA74026-4A	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
		Percent Solids:	74.9
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Antimony	7.2	2.8	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]
Arsenic	20.5	2.8	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]
Beryllium	0.61	0.28	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [2]	SW846 3050B [4]
Cadmium	1.9	0.69	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]
Chromium	1100	1.4	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]
Copper	202	3.4	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]
Lead	227	2.8	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]
Mercury	1.1	0.086	mg/kg	2	05/09/11	05/09/11	JW	SW846 7471A [3]	SW846 7471A [5]
Nickel	44.8	5.5	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]
Selenium	< 2.8	2.8	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]
Silver	< 0.69	0.69	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]
Thallium	< 1.4	1.4	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]
Zinc	711	2.8	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]

(1) Instrument QC Batch: MA26318
(2) Instrument QC Batch: MA26321
(3) Instrument QC Batch: MA29329
(4) Prep QC Batch: MP58049
(5) Prep QC Batch: MP58105

RL = Reporting Limit

Report of Analysis

Client Sample ID:	WC-5		
Lab Sample ID:	JA74026-5	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	SW846 8260B SW846 5035	**Percent Solids:**	78.3
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	D181525.D	1	04/29/11	MAH	04/26/11 09:00	n/a	VD7371
Run #2							

	Initial Weight	Final Volume	Methanol Aliquot
Run #1	4.8 g	5.0 ml	100 ul
Run #2			

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	800	180	ug/kg	
71-43-2	Benzene	107	80	27	ug/kg	
74-97-5	Bromochloromethane	ND	400	18	ug/kg	
75-27-4	Bromodichloromethane	ND	400	21	ug/kg	
75-25-2	Bromoform	ND	400	12	ug/kg	
74-83-9	Bromomethane	ND	400	32	ug/kg	
78-93-3	2-Butanone (MEK)	ND	800	160	ug/kg	
75-15-0	Carbon disulfide	ND	400	25	ug/kg	
56-23-5	Carbon tetrachloride	ND	400	45	ug/kg	
108-90-7	Chlorobenzene	ND	400	27	ug/kg	
75-00-3	Chloroethane	ND	400	80	ug/kg	
67-66-3	Chloroform	ND	400	26	ug/kg	
74-87-3	Chloromethane	ND	400	13	ug/kg	
110-82-7	Cyclohexane	874	400	12	ug/kg	
96-12-8	1,2-Dibromo-3-chloropropane	ND	800	43	ug/kg	
124-48-1	Dibromochloromethane	ND	400	8.8	ug/kg	
106-93-4	1,2-Dibromoethane	ND	80	11	ug/kg	
95-50-1	1,2-Dichlorobenzene	ND	400	22	ug/kg	
541-73-1	1,3-Dichlorobenzene	ND	400	22	ug/kg	
106-46-7	1,4-Dichlorobenzene	ND	400	27	ug/kg	
75-71-8	Dichlorodifluoromethane	ND	400	76	ug/kg	
75-34-3	1,1-Dichloroethane	ND	400	11	ug/kg	
107-06-2	1,2-Dichloroethane	ND	80	28	ug/kg	
75-35-4	1,1-Dichloroethene	ND	400	53	ug/kg	
156-59-2	cis-1,2-Dichloroethene	ND	400	19	ug/kg	
156-60-5	trans-1,2-Dichloroethene	ND	400	36	ug/kg	
78-87-5	1,2-Dichloropropane	ND	400	10	ug/kg	
10061-01-5	cis-1,3-Dichloropropene	ND	400	11	ug/kg	
10061-02-6	trans-1,3-Dichloropropene	ND	400	7.7	ug/kg	
123-91-1	1,4-Dioxane	ND	10000	6900	ug/kg	
100-41-4	Ethylbenzene	334	80	30	ug/kg	
76-13-1	Freon 113	ND	400	45	ug/kg	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	WC-5		
Lab Sample ID:	JA74026-5	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	SW846 8260B SW846 5035	**Percent Solids:**	78.3
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
591-78-6	2-Hexanone	ND	400	77	ug/kg	
98-82-8	Isopropylbenzene	504	400	42	ug/kg	
79-20-9	Methyl Acetate	96.7	400	66	ug/kg	J
108-87-2	Methylcyclohexane	2850	400	53	ug/kg	
1634-04-4	Methyl Tert Butyl Ether	ND	80	23	ug/kg	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	400	65	ug/kg	
75-09-2	Methylene chloride	ND	400	18	ug/kg	
100-42-5	Styrene	ND	400	8.6	ug/kg	
75-65-0	Tert Butyl Alcohol	ND	2000	1200	ug/kg	
79-34-5	1,1,2,2-Tetrachloroethane	ND	400	24	ug/kg	
127-18-4	Tetrachloroethene	ND	400	12	ug/kg	
108-88-3	Toluene	52.0	80	23	ug/kg	J
87-61-6	1,2,3-Trichlorobenzene	ND	400	47	ug/kg	
120-82-1	1,2,4-Trichlorobenzene	ND	400	28	ug/kg	
71-55-6	1,1,1-Trichloroethane	ND	400	10	ug/kg	
79-00-5	1,1,2-Trichloroethane	ND	400	15	ug/kg	
79-01-6	Trichloroethene	ND	400	42	ug/kg	
75-69-4	Trichlorofluoromethane	ND	400	18	ug/kg	
75-01-4	Vinyl chloride	ND	400	14	ug/kg	
	m,p-Xylene	70.7	160	38	ug/kg	J
95-47-6	o-Xylene	101	80	38	ug/kg	
1330-20-7	Xylene (total)	171	160	38	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	94%		67-131%
17060-07-0	1,2-Dichloroethane-D4	106%		66-130%
2037-26-5	Toluene-D8	107%		76-125%
460-00-4	4-Bromofluorobenzene	126%		53-142%

CAS No.	Tentatively Identified Compounds	R.T.	Est. Conc.	Units	Q
	cycloalkane/alkene	11.73	5200	ug/kg	J
	alkane	11.89	4800	ug/kg	J
	cycloalkane/alkene	13.49	5700	ug/kg	J
	alkane	14.93	9400	ug/kg	J
	cycloalkane/alkene	15.54	7000	ug/kg	J
	cycloalkane/alkene	16.44	4800	ug/kg	J
	Naphthalene decahydro	17.06	9700	ug/kg	J
	C4 alkyl benzene	17.33	12000	ug/kg	J

ND = Not detected   MDL - Method Detection Limit   J = Indicates an estimated value
RL = Reporting Limit   B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range   N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	WC-5		
Lab Sample ID:	JA74026-5	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	SW846 8260B SW846 5035	**Percent Solids:**	78.3
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

VOA TCL List (SOM0 1.1)

CAS No.	Tentatively Identified Compounds	R.T.	Est. Conc.	Units	Q
	1H-indene-dihydro-methyl	17.51	7400	ug/kg	J
	C4 alkyl benzene	17.77	11000	ug/kg	J
	Naphthalene decahydro-methyl	17.99	8900	ug/kg	J
	C5 alkyl benzene	18.37	5100	ug/kg	J
	C5 alkyl benzene	18.68	12000	ug/kg	J
	C5 alkyl benzene	18.83	6200	ug/kg	J
	1H-Indene-dihydro-dimethyl	18.88	4900	ug/kg	J
	Total TIC, Volatile		114100	ug/kg	J

(a) Dilution required due to matrix interference.

ND = Not detected MDL - Method Detection Limit J = Indicates an estimated value
RL = Reporting Limit B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	WC-5		
Lab Sample ID:	JA74026-5	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	SW846 8270C SW846 3550B	**Percent Solids:**	78.3
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	Z63121.D	2	04/29/11	KLS	04/27/11	OP49395	EZ3351
Run #2 [b]	Z63267.D	2	05/09/11	KLS	04/27/11	OP49395	EZ3361

	Initial Weight	Final Volume
Run #1	35.4 g	1.0 ml
Run #2	35.4 g	1.0 ml

ABN TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
95-57-8	2-Chlorophenol	ND	360	73	ug/kg	
59-50-7	4-Chloro-3-methyl phenol	ND	360	72	ug/kg	
120-83-2	2,4-Dichlorophenol	ND	360	120	ug/kg	
105-67-9	2,4-Dimethylphenol	ND	360	120	ug/kg	
51-28-5	2,4-Dinitrophenol	ND	1400	88	ug/kg	
534-52-1	4,6-Dinitro-o-cresol	ND	1400	88	ug/kg	
95-48-7	2-Methylphenol	ND	140	82	ug/kg	
	3&4-Methylphenol	ND	140	92	ug/kg	
88-75-5	2-Nitrophenol	ND	360	76	ug/kg	
100-02-7	4-Nitrophenol	ND	720	120	ug/kg	
87-86-5	Pentachlorophenol	ND	720	120	ug/kg	
108-95-2	Phenol	ND	140	76	ug/kg	
58-90-2	2,3,4,6-Tetrachlorophenol	ND	360	74	ug/kg	
95-95-4	2,4,5-Trichlorophenol	ND	360	84	ug/kg	
88-06-2	2,4,6-Trichlorophenol	ND	360	68	ug/kg	
83-32-9	Acenaphthene	1090	72	21	ug/kg	
208-96-8	Acenaphthylene	ND	72	23	ug/kg	
98-86-2	Acetophenone	ND	360	13	ug/kg	
120-12-7	Anthracene	720	72	25	ug/kg	
1912-24-9	Atrazine	ND	360	14	ug/kg	
56-55-3	Benzo(a)anthracene	634	72	24	ug/kg	
50-32-8	Benzo(a)pyrene	363	72	22	ug/kg	
205-99-2	Benzo(b)fluoranthene	250	72	24	ug/kg	
191-24-2	Benzo(g,h,i)perylene	102	72	27	ug/kg	
207-08-9	Benzo(k)fluoranthene	139	72	27	ug/kg	
101-55-3	4-Bromophenyl phenyl ether	ND	140	26	ug/kg	
85-68-7	Butyl benzyl phthalate	ND	140	42	ug/kg	
92-52-4	1,1'-Biphenyl	ND	140	8.4	ug/kg	
100-52-7	Benzaldehyde	ND	360	17	ug/kg	
91-58-7	2-Chloronaphthalene	ND	140	22	ug/kg	
106-47-8	4-Chloroaniline	ND	360	23	ug/kg	
86-74-8	Carbazole	ND	140	33	ug/kg	

ND = Not detected MDL - Method Detection Limit J = Indicates an estimated value
RL = Reporting Limit B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	WC-5		
Lab Sample ID:	JA74026-5	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	SW846 8270C SW846 3550B	**Percent Solids:**	78.3
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

ABN TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
105-60-2	Caprolactam	ND	140	23	ug/kg	
218-01-9	Chrysene	1370	72	24	ug/kg	
111-91-1	bis(2-Chloroethoxy)methane	ND	140	29	ug/kg	
111-44-4	bis(2-Chloroethyl)ether	ND	140	22	ug/kg	
108-60-1	bis(2-Chloroisopropyl)ether	ND	140	21	ug/kg	
7005-72-3	4-Chlorophenyl phenyl ether	ND	140	22	ug/kg	
121-14-2	2,4-Dinitrotoluene	ND	140	32	ug/kg	
606-20-2	2,6-Dinitrotoluene	ND	140	27	ug/kg	
91-94-1	3,3'-Dichlorobenzidine	ND	360	18	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	ND	72	25	ug/kg	
132-64-9	Dibenzofuran	456	140	21	ug/kg	
84-74-2	Di-n-butyl phthalate	ND	140	16	ug/kg	
117-84-0	Di-n-octyl phthalate	338	140	35	ug/kg	
84-66-2	Diethyl phthalate	ND	140	25	ug/kg	
131-11-3	Dimethyl phthalate	ND	140	25	ug/kg	
117-81-7	bis(2-Ethylhexyl)phthalate	1050	140	64	ug/kg	
206-44-0	Fluoranthene	426	72	32	ug/kg	
86-73-7	Fluorene	1570	72	24	ug/kg	
118-74-1	Hexachlorobenzene	ND	140	24	ug/kg	
87-68-3	Hexachlorobutadiene	ND	72	20	ug/kg	
77-47-4	Hexachlorocyclopentadiene	ND	1400	74	ug/kg	
67-72-1	Hexachloroethane	ND	360	20	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	70.9	72	25	ug/kg	J
78-59-1	Isophorone	ND	140	19	ug/kg	
91-57-6	2-Methylnaphthalene	ND	140	40	ug/kg	
88-74-4	2-Nitroaniline	ND	360	32	ug/kg	
99-09-2	3-Nitroaniline	ND	360	29	ug/kg	
100-01-6	4-Nitroaniline	ND	360	28	ug/kg	
91-20-3	Naphthalene	ND	72	20	ug/kg	
98-95-3	Nitrobenzene	ND	140	21	ug/kg	
621-64-7	N-Nitroso-di-n-propylamine	ND	140	18	ug/kg	
86-30-6	N-Nitrosodiphenylamine	ND	360	43	ug/kg	
85-01-8	Phenanthrene	2480	72	33	ug/kg	
129-00-0	Pyrene	1840	72	28	ug/kg	
95-94-3	1,2,4,5-Tetrachlorobenzene	ND	360	22	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	64%	61%	21-116%
4165-62-2	Phenol-d5	69%	69%	19-117%

ND = Not detected   MDL - Method Detection Limit   J = Indicates an estimated value
RL = Reporting Limit   B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range   N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	WC-5		
Lab Sample ID:	JA74026-5	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	SW846 8270C SW846 3550B	**Percent Solids:**	78.3
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

ABN TCL List (SOM0 1.1)

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
118-79-6	2,4,6-Tribromophenol	72%	27%	24-136%
4165-60-0	Nitrobenzene-d5	72%	77%	21-122%
321-60-8	2-Fluorobiphenyl	70%	86%	30-117%
1718-51-0	Terphenyl-d14	64%	70%	31-129%

CAS No.	Tentatively Identified Compounds	R.T.	Est. Conc.	Units	Q
	unknown	7.65	4400	ug/kg	J
90-12-0	Naphthalene, 1-methyl-	7.87	5600	ug/kg	JN
	unknown	8.41	5200	ug/kg	J
	unknown	8.72	4500	ug/kg	J
	Naphthalene dimethyl	8.85	7500	ug/kg	J
	unknown	8.90	5700	ug/kg	J
	alkene	8.98	4500	ug/kg	J
	alkane	9.05	33000	ug/kg	J
	unknown	9.22	5700	ug/kg	J
	unknown	9.49	5700	ug/kg	J
	Naphthalene trimethyl	9.56	6100	ug/kg	J
	Naphthalene trimethyl	9.75	12000	ug/kg	J
	Naphthalene trimethyl	9.80	12000	ug/kg	J
	alkane	9.90	4700	ug/kg	J
	Naphthalene trimethyl	9.94	5000	ug/kg	J
	Naphthalene trimethyl	9.97	4800	ug/kg	J
	Naphthalene trimethyl	10.06	8300	ug/kg	J
	unknown	10.36	14000	ug/kg	J
	unknown	10.41	4900	ug/kg	J
	unknown	10.48	4700	ug/kg	J
	alkane	10.55	25000	ug/kg	J
	unknown	13.59	7700	ug/kg	J
	unknown	13.66	5700	ug/kg	J
	unknown	13.88	13000	ug/kg	J
	unknown	14.09	4800	ug/kg	J
	Total TIC, Semi-Volatile		214500	ug/kg	J

(a) Dilution required due to viscosity of extract matrix
(b) Confirmation run for internal standard areas.

ND = Not detected MDL - Method Detection Limit J = Indicates an estimated value
RL = Reporting Limit B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	WC-5		
Lab Sample ID:	JA74026-5	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	SW846 8082 SW846 3545	**Percent Solids:**	78.3
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	XX107070.D	1	05/06/11	AZ	04/27/11	OP49392	GXX4051
Run #2							

	Initial Weight	Final Volume
Run #1	17.0 g	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	38	13	ug/kg	
11104-28-2	Aroclor 1221	ND	38	25	ug/kg	
11141-16-5	Aroclor 1232	ND	38	12	ug/kg	
53469-21-9	Aroclor 1242	ND	38	13	ug/kg	
12672-29-6	Aroclor 1248	ND	38	7.5	ug/kg	
11097-69-1	Aroclor 1254	266	38	9.5	ug/kg	
11096-82-5	Aroclor 1260	ND	38	15	ug/kg	
11100-14-4	Aroclor 1268	ND	38	8.5	ug/kg	
37324-23-5	Aroclor 1262	ND	38	7.6	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	73%		22-141%
877-09-8	Tetrachloro-m-xylene	95%		22-141%
2051-24-3	Decachlorobiphenyl	73%		18-163%
2051-24-3	Decachlorobiphenyl	89%		18-163%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	WC-5		
Lab Sample ID:	JA74026-5	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
		Percent Solids:	78.3
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

Metals Analysis, TCLP Leachate SW846 1311

Analyte	Result	HW#	MCL	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Arsenic	< 0.50	D004	5.0	0.50	mg/l	1	05/05/11	05/06/11	ND	SW846 6010B [1]	SW846 3010A [4]
Barium	< 1.0	D005	100	1.0	mg/l	1	05/05/11	05/06/11	ND	SW846 6010B [1]	SW846 3010A [4]
Cadmium	< 0.0050	D006	1.0	0.0050	mg/l	1	05/05/11	05/06/11	ND	SW846 6010B [1]	SW846 3010A [4]
Chromium	0.13	D007	5.0	0.010	mg/l	1	05/05/11	05/07/11	GT	SW846 6010B [2]	SW846 3010A [4]
Lead	< 0.50	D008	5.0	0.50	mg/l	1	05/05/11	05/06/11	ND	SW846 6010B [1]	SW846 3010A [4]
Mercury	< 0.00020	D009	0.20	0.00020	mg/l	1	05/09/11	05/09/11	VK	SW846 7470A [3]	SW846 7470A [5]
Selenium	< 0.50	D010	1.0	0.50	mg/l	1	05/05/11	05/06/11	ND	SW846 6010B [1]	SW846 3010A [4]
Silver	< 0.010	D011	5.0	0.010	mg/l	1	05/05/11	05/06/11	ND	SW846 6010B [1]	SW846 3010A [4]

(1) Instrument QC Batch: MA26316
(2) Instrument QC Batch: MA26321
(3) Instrument QC Batch: MA26332
(4) Prep QC Batch: MP58048
(5) Prep QC Batch: MP58106

RL = Reporting Limit
MCL = Maximum Contamination Level (40 CFR 261 6/96)

Report of Analysis

Client Sample ID:	WC-5		
Lab Sample ID:	JA74026-5	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
		Percent Solids:	78.3
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Paint Filter Test [a]	< 0.50	0.50	ml/100g	1	04/28/11	LMM	SW846 9095B
Solids, Percent	78.3		%	1	05/06/11	JB	SM18 2540G

(a) No free liquids.

RL = Reporting Limit

Report of Analysis

Client Sample ID:	WC-5		
Lab Sample ID:	JA74026-5A	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
		Percent Solids:	78.3
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Antimony	6.5	2.5	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]
Arsenic	17.2	2.5	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]
Beryllium	0.51	0.25	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [2]	SW846 3050B [4]
Cadmium	1.9	0.61	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]
Chromium	994	1.2	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]
Copper	276	3.1	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]
Lead	152	2.5	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]
Mercury	1.0	0.076	mg/kg	2	05/09/11	05/09/11	JW	SW846 7471A [3]	SW846 7471A [5]
Nickel	41.5	4.9	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]
Selenium	< 2.5	2.5	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]
Silver	0.63	0.61	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]
Thallium	< 1.2	1.2	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]
Zinc	692	2.5	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]

(1) Instrument QC Batch: MA26318
(2) Instrument QC Batch: MA26321
(3) Instrument QC Batch: MA26329
(4) Prep QC Batch: MP58049
(5) Prep QC Batch: MP58105

RL = Reporting Limit

Report of Analysis

Client Sample ID:	WC-6		
Lab Sample ID:	JA74026-6	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	SW846 8260B SW846 5035	**Percent Solids:**	76.2
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	D181526.D	1	04/29/11	MAH	04/26/11 09:00	n/a	VD7371
Run #2							

	Initial Weight	Final Volume	Methanol Aliquot
Run #1	5.0 g	5.0 ml	100 ul
Run #2			

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	810	180	ug/kg	
71-43-2	Benzene	30.1	81	28	ug/kg	J
74-97-5	Bromochloromethane	ND	410	18	ug/kg	
75-27-4	Bromodichloromethane	ND	410	21	ug/kg	
75-25-2	Bromoform	ND	410	12	ug/kg	
74-83-9	Bromomethane	ND	410	33	ug/kg	
78-93-3	2-Butanone (MEK)	ND	810	160	ug/kg	
75-15-0	Carbon disulfide	ND	410	25	ug/kg	
56-23-5	Carbon tetrachloride	ND	410	45	ug/kg	
108-90-7	Chlorobenzene	ND	410	28	ug/kg	
75-00-3	Chloroethane	ND	410	81	ug/kg	
67-66-3	Chloroform	ND	410	26	ug/kg	
74-87-3	Chloromethane	ND	410	13	ug/kg	
110-82-7	Cyclohexane	355	410	12	ug/kg	J
96-12-8	1,2-Dibromo-3-chloropropane	ND	810	44	ug/kg	
124-48-1	Dibromochloromethane	ND	410	8.9	ug/kg	
106-93-4	1,2-Dibromoethane	ND	81	11	ug/kg	
95-50-1	1,2-Dichlorobenzene	ND	410	22	ug/kg	
541-73-1	1,3-Dichlorobenzene	ND	410	22	ug/kg	
106-46-7	1,4-Dichlorobenzene	ND	410	27	ug/kg	
75-71-8	Dichlorodifluoromethane	ND	410	77	ug/kg	
75-34-3	1,1-Dichloroethane	ND	410	11	ug/kg	
107-06-2	1,2-Dichloroethane	ND	81	28	ug/kg	
75-35-4	1,1-Dichloroethene	ND	410	54	ug/kg	
156-59-2	cis-1,2-Dichloroethene	ND	410	19	ug/kg	
156-60-5	trans-1,2-Dichloroethene	ND	410	36	ug/kg	
78-87-5	1,2-Dichloropropane	ND	410	11	ug/kg	
10061-01-5	cis-1,3-Dichloropropene	ND	410	11	ug/kg	
10061-02-6	trans-1,3-Dichloropropene	ND	410	7.8	ug/kg	
123-91-1	1,4-Dioxane	ND	10000	7000	ug/kg	
100-41-4	Ethylbenzene	ND	81	30	ug/kg	
76-13-1	Freon 113	ND	410	46	ug/kg	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	WC-6		
Lab Sample ID:	JA74026-6	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	SW846 8260B SW846 5035	**Percent Solids:**	76.2
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

VOA TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
591-78-6	2-Hexanone	ND	410	78	ug/kg	
98-82-8	Isopropylbenzene	192	410	42	ug/kg	J
79-20-9	Methyl Acetate	94.6	410	67	ug/kg	J
108-87-2	Methylcyclohexane	1100	410	53	ug/kg	
1634-04-4	Methyl Tert Butyl Ether	ND	81	23	ug/kg	
108-10-1	4-Methyl-2-pentanone(MIBK)	ND	410	66	ug/kg	
75-09-2	Methylene chloride	ND	410	18	ug/kg	
100-42-5	Styrene	ND	410	8.7	ug/kg	
75-65-0	Tert Butyl Alcohol	ND	2000	1200	ug/kg	
79-34-5	1,1,2,2-Tetrachloroethane	ND	410	24	ug/kg	
127-18-4	Tetrachloroethene	ND	410	12	ug/kg	
108-88-3	Toluene	ND	81	24	ug/kg	
87-61-6	1,2,3-Trichlorobenzene	ND	410	48	ug/kg	
120-82-1	1,2,4-Trichlorobenzene	ND	410	28	ug/kg	
71-55-6	1,1,1-Trichloroethane	ND	410	10	ug/kg	
79-00-5	1,1,2-Trichloroethane	ND	410	15	ug/kg	
79-01-6	Trichloroethene	ND	410	43	ug/kg	
75-69-4	Trichlorofluoromethane	ND	410	19	ug/kg	
75-01-4	Vinyl chloride	ND	410	14	ug/kg	
	m,p-Xylene	50.0	160	38	ug/kg	J
95-47-6	o-Xylene	57.9	81	38	ug/kg	J
1330-20-7	Xylene (total)	108	160	38	ug/kg	J

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	94%		67-131%
17060-07-0	1,2-Dichloroethane-D4	106%		66-130%
2037-26-5	Toluene-D8	108%		76-125%
460-00-4	4-Bromofluorobenzene	126%		53-142%

CAS No.	Tentatively Identified Compounds	R.T.	Est. Conc.	Units	Q
	cycloalkane/alkene	11.73	4700	ug/kg	J
	alkane	11.90	4700	ug/kg	J
	cycloalkane/alkene	13.50	6700	ug/kg	J
	alkane	14.93	8800	ug/kg	J
	Naphthalene decahydro	17.06	6200	ug/kg	J
	C4 alkyl benzene	17.32	6100	ug/kg	J
	C4 alkyl benzene	17.76	6300	ug/kg	J
	Naphthalene decahydro-methyl	17.99	5000	ug/kg	J

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	WC-6		
Lab Sample ID:	JA74026-6	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	SW846 8260B SW846 5035	**Percent Solids:**	76.2
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

VOA TCL List (SOM0 1.1)

CAS No.	Tentatively Identified Compounds	R.T.	Est. Conc.	Units	Q
	C5 alkyl benzene	18.68	6300	ug/kg	J
	C5 alkyl benzene	18.84	5600	ug/kg	J
	Total TIC, Volatile		60400	ug/kg	J

(a) Dilution required due to matrix interference.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	WC-6			
Lab Sample ID:	JA74026-6		**Date Sampled:**	04/25/11
Matrix:	SO - Soil		**Date Received:**	04/25/11
Method:	SW846 8270C SW846 3550B		**Percent Solids:**	76.2
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ			

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1 [a]	Z63123.D	2	04/29/11	KLS	04/27/11	OP49395	EZ3351
Run #2							

	Initial Weight	Final Volume
Run #1	35.4 g	1.0 ml
Run #2		

ABN TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
95-57-8	2-Chlorophenol	ND	370	75	ug/kg	
59-50-7	4-Chloro-3-methyl phenol	ND	370	74	ug/kg	
120-83-2	2,4-Dichlorophenol	ND	370	120	ug/kg	
105-67-9	2,4-Dimethylphenol	ND	370	120	ug/kg	
51-28-5	2,4-Dinitrophenol	ND	1500	90	ug/kg	
534-52-1	4,6-Dinitro-o-cresol	ND	1500	90	ug/kg	
95-48-7	2-Methylphenol	ND	150	85	ug/kg	
	3&4-Methylphenol	ND	150	94	ug/kg	
88-75-5	2-Nitrophenol	ND	370	79	ug/kg	
100-02-7	4-Nitrophenol	ND	740	130	ug/kg	
87-86-5	Pentachlorophenol	ND	740	130	ug/kg	
108-95-2	Phenol	ND	150	78	ug/kg	
58-90-2	2,3,4,6-Tetrachlorophenol	ND	370	76	ug/kg	
95-95-4	2,4,5-Trichlorophenol	ND	370	86	ug/kg	
88-06-2	2,4,6-Trichlorophenol	ND	370	70	ug/kg	
83-32-9	Acenaphthene	2070	74	22	ug/kg	
208-96-8	Acenaphthylene	ND	74	24	ug/kg	
98-86-2	Acetophenone	ND	370	13	ug/kg	
120-12-7	Anthracene	1220	74	26	ug/kg	
1912-24-9	Atrazine	ND	370	15	ug/kg	
56-55-3	Benzo(a)anthracene	834	74	24	ug/kg	
50-32-8	Benzo(a)pyrene	481	74	23	ug/kg	
205-99-2	Benzo(b)fluoranthene	296	74	25	ug/kg	
191-24-2	Benzo(g,h,i)perylene	203	74	28	ug/kg	
207-08-9	Benzo(k)fluoranthene	149	74	28	ug/kg	
101-55-3	4-Bromophenyl phenyl ether	ND	150	27	ug/kg	
85-68-7	Butyl benzyl phthalate	ND	150	43	ug/kg	
92-52-4	1,1'-Biphenyl	ND	150	8.6	ug/kg	
100-52-7	Benzaldehyde	ND	370	17	ug/kg	
91-58-7	2-Chloronaphthalene	ND	150	23	ug/kg	
106-47-8	4-Chloroaniline	ND	370	24	ug/kg	
86-74-8	Carbazole	ND	150	34	ug/kg	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	WC-6		
Lab Sample ID:	JA74026-6	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	SW846 8270C SW846 3550B	**Percent Solids:**	76.2
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

ABN TCL List (SOM0 1.1)

CAS No.	Compound	Result	RL	MDL	Units	Q
105-60-2	Caprolactam	ND	150	23	ug/kg	
218-01-9	Chrysene	1680	74	25	ug/kg	
111-91-1	bis(2-Chloroethoxy)methane	ND	150	30	ug/kg	
111-44-4	bis(2-Chloroethyl)ether	ND	150	22	ug/kg	
108-60-1	bis(2-Chloroisopropyl)ether	ND	150	22	ug/kg	
7005-72-3	4-Chlorophenyl phenyl ether	ND	150	22	ug/kg	
121-14-2	2,4-Dinitrotoluene	ND	150	32	ug/kg	
606-20-2	2,6-Dinitrotoluene	ND	150	28	ug/kg	
91-94-1	3,3'-Dichlorobenzidine	ND	370	19	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	115	74	25	ug/kg	
132-64-9	Dibenzofuran	1040	150	22	ug/kg	
84-74-2	Di-n-butyl phthalate	ND	150	16	ug/kg	
117-84-0	Di-n-octyl phthalate	ND	150	36	ug/kg	
84-66-2	Diethyl phthalate	ND	150	25	ug/kg	
131-11-3	Dimethyl phthalate	ND	150	26	ug/kg	
117-81-7	bis(2-Ethylhexyl)phthalate	1360	150	65	ug/kg	
206-44-0	Fluoranthene	560	74	33	ug/kg	
86-73-7	Fluorene	2750	74	24	ug/kg	
118-74-1	Hexachlorobenzene	ND	150	24	ug/kg	
87-68-3	Hexachlorobutadiene	ND	74	21	ug/kg	
77-47-4	Hexachlorocyclopentadiene	ND	1500	76	ug/kg	
67-72-1	Hexachloroethane	ND	370	21	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	125	74	26	ug/kg	
78-59-1	Isophorone	ND	150	20	ug/kg	
91-57-6	2-Methylnaphthalene	ND	150	41	ug/kg	
88-74-4	2-Nitroaniline	ND	370	33	ug/kg	
99-09-2	3-Nitroaniline	ND	370	30	ug/kg	
100-01-6	4-Nitroaniline	ND	370	29	ug/kg	
91-20-3	Naphthalene	ND	74	20	ug/kg	
98-95-3	Nitrobenzene	ND	150	21	ug/kg	
621-64-7	N-Nitroso-di-n-propylamine	ND	150	18	ug/kg	
86-30-6	N-Nitrosodiphenylamine	ND	370	44	ug/kg	
85-01-8	Phenanthrene	4370	74	34	ug/kg	
129-00-0	Pyrene	2250	74	28	ug/kg	
95-94-3	1,2,4,5-Tetrachlorobenzene	ND	370	23	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	73%		21-116%
4165-62-2	Phenol-d5	65%		19-117%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	WC-6		
Lab Sample ID:	JA74026-6	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	SW846 8270C SW846 3550B	**Percent Solids:**	76.2
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

ABN TCL List (SOM0 1.1)

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
118-79-6	2,4,6-Tribromophenol	115%		24-136%
4165-60-0	Nitrobenzene-d5	57%		21-122%
321-60-8	2-Fluorobiphenyl	86%		30-117%
1718-51-0	Terphenyl-d14	79%		31-129%

CAS No.	Tentatively Identified Compounds	R.T.	Est. Conc.	Units	Q
	cycloalkane/alkene	7.08	4600	ug/kg	J
	unknown	7.18	3800	ug/kg	J
	alkane	7.35	16000	ug/kg	J
	unknown	7.65	5000	ug/kg	J
	unknown	7.75	4900	ug/kg	J
90-12-0	Naphthalene, 1-methyl-	7.88	6600	ug/kg	JN
	unknown	8.14	3800	ug/kg	J
	unknown	8.42	4700	ug/kg	J
	Naphthalene dimethyl	8.72	4600	ug/kg	J
	Naphthalene dimethyl	8.86	7800	ug/kg	J
	unknown	8.91	4700	ug/kg	J
	cycloalkane/alkene	8.98	4000	ug/kg	J
	alkane	9.06	27000	ug/kg	J
	Naphthalene dimethyl	9.17	5400	ug/kg	J
	unknown	9.23	4900	ug/kg	J
	Naphthalene trimethyl	9.49	4200	ug/kg	J
	Naphthalene trimethyl	9.57	4600	ug/kg	J
	Naphthalene trimethyl	9.76	9400	ug/kg	J
	Naphthalene trimethyl	9.81	10000	ug/kg	J
	Naphthalene trimethyl	10.07	5700	ug/kg	J
	unknown	10.37	9300	ug/kg	J
	alkane	10.56	21000	ug/kg	J
	alkane	11.02	4100	ug/kg	J
	unknown	13.60	4600	ug/kg	J
	unknown	13.89	6700	ug/kg	J
	Total TIC, Semi-Volatile		187400	ug/kg	J

(a) Dilution required due to viscosity of extract matrix

ND = Not detected   MDL - Method Detection Limit   J = Indicates an estimated value
RL = Reporting Limit   B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range   N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	WC-6		
Lab Sample ID:	JA74026-6	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
Method:	SW846 8082 SW846 3545	**Percent Solids:**	76.2
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	XX107071.D	1	05/06/11	AZ	04/27/11	OP49392	GXX4051
Run #2							

	Initial Weight	Final Volume
Run #1	17.0 g	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	39	14	ug/kg	
11104-28-2	Aroclor 1221	ND	39	26	ug/kg	
11141-16-5	Aroclor 1232	ND	39	12	ug/kg	
53469-21-9	Aroclor 1242	ND	39	14	ug/kg	
12672-29-6	Aroclor 1248	ND	39	7.7	ug/kg	
11097-69-1	Aroclor 1254	354	39	9.7	ug/kg	
11096-82-5	Aroclor 1260	ND	39	15	ug/kg	
11100-14-4	Aroclor 1268	ND	39	8.7	ug/kg	
37324-23-5	Aroclor 1262	ND	39	7.8	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	74%		22-141%
877-09-8	Tetrachloro-m-xylene	99%		22-141%
2051-24-3	Decachlorobiphenyl	69%		18-163%
2051-24-3	Decachlorobiphenyl	91%		18-163%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	WC-6		
Lab Sample ID:	JA74026-6	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
		Percent Solids:	76.2
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

Metals Analysis, TCLP Leachate SW846 1311

Analyte	Result	HW#	MCL	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Arsenic	< 0.50	D004	5.0	0.50	mg/l	1	05/05/11	05/06/11	ND	SW846 6010B [1]	SW846 3010A [4]
Barium	< 1.0	D005	100	1.0	mg/l	1	05/05/11	05/06/11	ND	SW846 6010B [1]	SW846 3010A [4]
Cadmium	0.0054	D006	1.0	0.0050	mg/l	1	05/05/11	05/06/11	ND	SW846 6010B [1]	SW846 3010A [4]
Chromium	0.14	D007	5.0	0.010	mg/l	1	05/05/11	05/07/11	GT	SW846 6010B [2]	SW846 3010A [4]
Lead	< 0.50	D008	5.0	0.50	mg/l	1	05/05/11	05/06/11	ND	SW846 6010B [1]	SW846 3010A [4]
Mercury	< 0.00020	D009	0.20	0.00020	mg/l	1	05/09/11	05/09/11	VK	SW846 7470A [3]	SW846 7470A [5]
Selenium	< 0.50	D010	1.0	0.50	mg/l	1	05/05/11	05/06/11	ND	SW846 6010B [1]	SW846 3010A [4]
Silver	< 0.010	D011	5.0	0.010	mg/l	1	05/05/11	05/06/11	ND	SW846 6010B [1]	SW846 3010A [4]

(1) Instrument QC Batch: MA26316
(2) Instrument QC Batch: MA26321
(3) Instrument QC Batch: MA26332
(4) Prep QC Batch: MP58048
(5) Prep QC Batch: MP58106

RL = Reporting Limit
MCL = Maximum Contamination Level (40 CFR 261 6/96)

Report of Analysis

Client Sample ID:	WC-6		
Lab Sample ID:	JA74026-6	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
		Percent Solids:	76.2
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Paint Filter Test [a]	< 0.50	0.50	ml/100g	1	04/28/11	LMM	SW846 9095B
Solids, Percent	76.2		%	1	05/06/11	JB	SM18 2540G

(a) No free liquids.

RL = Reporting Limit

Report of Analysis

Client Sample ID:	WC-6		
Lab Sample ID:	JA74026-6A	**Date Sampled:**	04/25/11
Matrix:	SO - Soil	**Date Received:**	04/25/11
		Percent Solids:	76.2
Project:	Hess-Port Reading Refinery, 750 Cliff Road, Port Reading, NJ		

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Antimony	6.3	2.6	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]
Arsenic	18.0	2.6	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]
Beryllium	0.54	0.26	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [2]	SW846 3050B [4]
Cadmium	1.9	0.65	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]
Chromium	993	1.3	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]
Copper	167	3.2	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]
Lead	137	2.6	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]
Mercury	1.3	0.080	mg/kg	2	05/09/11	05/09/11	JW	SW846 7471A [3]	SW846 7471A [5]
Nickel	39.8	5.2	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]
Selenium	< 2.6	2.6	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]
Silver	< 0.65	0.65	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]
Thallium	< 1.3	1.3	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]
Zinc	634	2.6	mg/kg	1	05/06/11	05/07/11	GT	SW846 6010B [1]	SW846 3050B [4]

(1) Instrument QC Batch: MA26318
(2) Instrument QC Batch: MA26321
(3) Instrument QC Batch: MA26329
(4) Prep QC Batch: MP58049
(5) Prep QC Batch: MP58105

RL = Reporting Limit

New Jersey ACCUTEST LABORATORIES

Misc. Forms

Custody Documents and Other Forms

Includes the following where applicable:

- Chain of Custody

ACCUTEST LABORATORIES

Sbk

CHAIN OF CUSTODY

2235 Route 130, Dayton, NJ 08810
Tel: 732-329-0200 FAX: 732-329-3499/3480
www. acutest.com

PAGE 1 OF 1

FED-EX Tracking #
Bottle Order Control #
Accutest Quote #
Accutest Job # JA74026

Client / Reporting Information

Company Name: ENVIROTRAC
Street Address: 400 CORPORATE CT
City: S. PLAINFIELD State: NJ Zip
Project Contact: BILL GRUNING E-mail
Phone # Fax #
Sampler(s) Name(s) Phone #

Project Information

Project Name: Hess Port Reading - Aeration Basin
Street: 750 Cliff Rd
City: Woodbridge State: NJ
Project #
Client Purchase Order #
Project Manager

Billing Information (if different from Report to)
Company Name: Hess Corp
Street Address: 750 Cliff Rd.
City: Woodbridge State: NJ Zip
Attention: Howard Goldman

Requested Analysis (see TEST CODE sheet): VOC, SVOC, Metals, PCB, PNT-FD, TCLP Metals

Matrix Codes: DW - Drinking Water, GW - Ground Water, WW - Water, SW - Surface Water, SO - Soil, SL- Sludge, SED-Sediment, OI - Oil, LIQ - Other Liquid, AIR - Air, SOL - Other Solid, WP - Wipe, FB-Field Blank, EB-Equipment Blank, RB- Rinse Blank, TB-Trip Blank

Accutest Sample #	Field ID / Point of Collection	MEOH/DI Vial #	Collection Date	Collection Time	Sampled by	Matrix	# of bottles	HCl	NaOH	HNO3	H2SO4	NONE	DI Water	MEOH	ENCORE	VOC	SVOC	Metals	PCB	PNT-FD	TCLP Metals	LAB USE ONLY
1	WC-1	0	4-25-11	1231	KM	SO	4					1			3	X	X	X	X	X	X	EX65
2	WC-2			1242	KM																	14W4
3	WC-3			1254	KM																	4918
4	WC-4			1234	RD																	
5	WC-5			1240	RD																	
6	WC-6	0		1246	RD																	

Turnaround Time (Business days)

- [x] Std. 15 Business Days
- [ ] Std. 10 Business Days (by Contract only)
- [ ] 10 Day RUSH
- [ ] 5 Day RUSH
- [ ] 3 Day EMERGENCY
- [ ] 2 Day EMERGENCY
- [ ] 1 Day EMERGENCY

Emergency & Rush T/A data available VIA Lablink

Approved By (Accutest PM): / Date:

Data Deliverable Information

- [ ] Commercial "A" (Level 1)
- [ ] Commercial "B" (Level 2)
- [ ] FULLT1 (Level 3+4)
- [x] NJ Reduced
- [ ] Commercial "C"
- [ ] NYASP Category A
- [ ] NYASP Category B
- [ ] State Forms
- [ ] EDD Format
- [ ] Other

Commercial "A" = Results Only
Commercial "B" = Results + QC Summary
NJ Reduced = Results + QC Summary + Partial Raw data

Comments / Special Instructions

3 Encores 4-25-11
Samples Received Directly From Field Sampling
OK TO PROCESS
KCM

Sample Custody must be documented below each time samples change possession, including courier delivery.

Relinquished by Sampler:	Date Time:	Received By:	Relinquished By:	Date Time:	Received By:
1 K. C. MA	4/25/11 1335	1	2		2
Relinquished by Sampler: 3	Date Time:	Received By: 3	Relinquished By: 4	Date Time:	Received By: 4
Relinquished by: 5	Date Time:	Received By: 5	Custody Seal #	☐ Intact ☐ Not intact	Preserved where applicable ☐ On Ice ☐ Cooler Temp. 21.5 22.0 °C

JA74026: Chain of Custody
Page 1 of 2

Accutest Laboratories Sample Receipt Summary

Accutest Job Number: JA74026 **Client:** **Immediate Client Services Action Required:** No

Date / Time Received: 4/25/2011 **Delivery Method:** **Client Service Action Required at Login:** No

Project: **No. Coolers:** 1 **Airbill #'s:**

Cooler Security	Y	N		Y	N
1. Custody Seals Present:	☑	☐	3. COC Present:	☑	☐
2. Custody Seals Intact:	☑	☐	4. Smpl Dates/Time OK	☑	☐

Cooler Temperature	Y	N
1. Temp criteria achieved:	☑	☐
2. Cooler temp verification:	Infared gun	
3. Cooler media:	Ice (bag)	

Quality Control Preservatio	Y	N	N/A
1. Trip Blank present / cooler:	☐	☐	☑
2. Trip Blank listed on COC:	☐	☐	☑
3. Samples preserved properly:	☑	☐	
4. VOCs headspace free:	☐	☐	☑

Sample Integrity - Documentation	Y	N
1. Sample labels present on bottles:	☑	☐
2. Container labeling complete:	☑	☐
3. Sample container label / COC agree:	☑	☐

Sample Integrity - Condition	Y	N
1. Sample recvd within HT:	☑	☐
2. All containers accounted for:	☑	☐
3. Condition of sample:	Intact	

Sample Integrity - Instructions	Y	N	N/A
1. Analysis requested is clear:	☑	☐	
2. Bottles received for unspecified tests	☐	☑	
3. Sufficient volume recvd for analysis:	☑	☐	
4. Compositing instructions clear:	☐	☐	☑
5. Filtering instructions clear:	☐	☐	☑

Comments

Accutest Laboratories
V:732.329.0200
2235 US Highway 130
F: 732.329.3499
Dayton, New Jersey
www/accutest.com

JA74026: Chain of Custody
Page 2 of 2

APPENDIX XI

Detritus Disposal Documentation

Acknowledgment of Treatment and Recycling

Bayshore Soil Management, LLC hereby acknowledges

The Treatment

Of 378.86 tons of

Petroleum Contaminated Soil
(Received on 7/5/11)

From the **Port Reading Refinery, Port Reading, NJ**

Bayshore Soil Management, LLC.

July 6, 2011
AIR: Facility ID Number 18437; Permit PCP100001
CLASS B: Facility ID Number 132397: Permit CBG090002
Keasbey, New Jersey

Certificate Number 2711-327-070511

57700

641

Acknowledgment of Treatment and Recycling

Bayshore Soil Management, LLC hereby acknowledges

The Treatment

Of 739.82 tons of

Petroleum Contaminated Soil
(Received on 7/6/11)

From the **Port Reading Refinery, Port Reading, NJ**

Bayshore Soil Management, LLC.

July 7, 2011
AIR: Facility ID Number 18437; Permit PCP100001
CLASS B: Facility ID Number 132397: Permit CBG090002
Keasbey, New Jersey

Certificate Number 2711-327-070611

Acknowledgment of Treatment and Recycling

Bayshore Soil Management, LLC hereby acknowledges

The Treatment

Of 619.66 tons of

Petroleum Contaminated Soil
(Received on 7/7/11)

From the **Port Reading Refinery, Port Reading, NJ**

Bayshore Soil Management, LLC.

July 8, 2011
AIR: Facility ID Number 18437; Permit PCP100001
CLASS B: Facility ID Number 132397: Permit CBG090002
Keasbey, New Jersey

Certificate Number 2711-327-070711

Acknowledgment of Treatment and Recycling

Bayshore Soil Management, LLC hereby acknowledges

The Treatment

Of 437.31 tons of

Petroleum Contaminated Soil
(Received on 7/8/11)

From the **Port Reading Refinery, Port Reading, NJ**

Bayshore Soil Management, LLC.

July 11, 2011
AIR: Facility ID Number 18437; Permit PCP100001
CLASS B: Facility ID Number 132397: Permit CBG090002
Keasbey, New Jersey

Certificate Number 2711-327-070811

Acknowledgment of Treatment and Recycling

Bayshore Soil Management, LLC hereby acknowledges

The Treatment

Of 777.35 tons of

Petroleum Contaminated Soil
(Received on 7/11/11)

From the **Port Reading Refinery, Port Reading, NJ**

Bayshore Soil Management, LLC.

July 12, 2011
AIR: Facility ID Number 18437; Permit PCP100001
CLASS B: Facility ID Number 132397: Permit CBG090002
Keasbey, New Jersey

Certificate Number 2711-327-071111

Acknowledgment of Treatment and Recycling

Bayshore Soil Management, LLC hereby acknowledges

The Treatment

Of 923.96 tons of

Petroleum Contaminated Soil
(Received on 7/12/11)

From the **Port Reading Refinery, Port Reading, NJ**

Bayshore Soil Management, LLC.

July 13, 2011
AIR: Facility ID Number 18437; Permit PCP100001
CLASS B: Facility ID Number 132397: Permit CBG090002
Keasbey, New Jersey

Certificate Number 2711-327-071211

Acknowledgment of Treatment and Recycling

Bayshore Soil Management, LLC hereby acknowledges

The Treatment

Of 903.65 tons of

Petroleum Contaminated Soil
(Received on 7/13/11)

From the **Port Reading Refinery, Port Reading, NJ**

Bayshore Soil Management, LLC.

July 14, 2011
AIR: Facility ID Number 18437; Permit PCP100001
CLASS B: Facility ID Number 132397: Permit CBG090002
Keasbey, New Jersey

Certificate Number 2711-327-071311

Acknowledgment of Treatment and Recycling

Bayshore Soil Management, LLC hereby acknowledges

The Treatment

Of 516.84 tons of

Petroleum Contaminated Soil
(Received on 7/14/11)

From the **Port Reading Refinery, Port Reading, NJ**

Bayshore Soil Management, LLC.

July 15, 2011
AIR: Facility ID Number 18437; Permit PCP100001
CLASS B: Facility ID Number 132397: Permit CBG090002
Keasbey, New Jersey

Certificate Number 2711-327-071411

Acknowledgment of Treatment and Recycling

Bayshore Soil Management, LLC hereby acknowledges

The Treatment

Of 661.56 tons of

Petroleum Contaminated Soil
(Received on 7/15/11)

From the **Port Reading Refinery, Port Reading, NJ**

Bayshore Soil Management, LLC.

July 18, 2011
AIR: Facility ID Number 18437; Permit PCP100001
CLASS B: Facility ID Number 132397: Permit CBG090002
Keasbey, New Jersey

Certificate Number 2711-327-071511

Acknowledgment of Treatment and Recycling

Bayshore Soil Management, LLC hereby acknowledges

The Treatment

Of 752.51 tons of

Petroleum Contaminated Soil
(Received on 7/18/11)

From the **Port Reading Refinery, Port Reading, NJ**

Bayshore Soil Management, LLC.

July 19, 2011
AIR: Facility ID Number 18437; Permit PCP100001
CLASS B: Facility ID Number 132397: Permit CBG090002
Keasbey, New Jersey

Certificate Number 2711-327-071811

Acknowledgment of Treatment and Recycling

Bayshore Soil Management, LLC hereby acknowledges

The Treatment

Of 360.58 tons of

Petroleum Contaminated Soil
(Received on 7/19/11)

From the **Port Reading Refinery, Port Reading, NJ**

Bayshore Soil Management, LLC.

July 20, 2011
AIR: Facility ID Number 18437; Permit PCP100001
CLASS B: Facility ID Number 132397: Permit CBG090002
Keasbey, New Jersey

Certificate Number 2711-327-071911

200061059

Acknowledgment of Treatment and Recycling

Bayshore Soil Management, LLC hereby acknowledges

The Treatment

Of 259.83 tons of

Petroleum Contaminated Soil
(Received on 7/20/11)

From the **Port Reading Refinery, Port Reading, NJ**

Bayshore Soil Management, LLC.

July 21, 2011
AIR: Facility ID Number 18437; Permit PCP100001
CLASS B: Facility ID Number 132397: Permit CBG090002
Keasbey, New Jersey

Certificate Number 2711-327-072011

Acknowledgment of Treatment and Recycling

Bayshore Soil Management, LLC hereby acknowledges

The Treatment

Of 295.10 tons of

Petroleum Contaminated Soil
(Received on 7/26/11)

From the **Port Reading Refinery, Port Reading, NJ**

Bayshore Soil Management, LLC.

July 27, 2011
AIR: Facility ID Number 18437; Permit PCP100001
CLASS B: Facility ID Number 132397: Permit CBG090002
Keasbey, New Jersey

Certificate Number 2711-327-072611

2200065190

Acknowledgment of Treatment and Recycling

Bayshore Soil Management, LLC hereby acknowledges

The Treatment

Of 465.04 tons of

Petroleum Contaminated Soil
(Received on 7/27/11)

From the **Port Reading Refinery, Port Reading, NJ**

Bayshore Soil Management, LLC.

July 28, 2011
AIR: Facility ID Number 18437; Permit PCP100001
CLASS B: Facility ID Number 132397: Permit CBG090002
Keasbey, New Jersey

Certificate Number 2711-327-072711

00065729

8832

Acknowledgment of Treatment and Recycling

Bayshore Soil Management, LLC hereby acknowledges

The Treatment

Of 198.30 tons of

Petroleum Contaminated Soil
(Received on 7/28/11)

From the **Port Reading Refinery, Port Reading, NJ**

Bayshore Soil Management, LLC.

July 29, 2011
AIR: Facility ID Number 18437; Permit PCP100001
CLASS B: Facility ID Number 132397: Permit CBG090002
Keasbey, New Jersey

Certificate Number 2711-327-072811

Acknowledgment of Treatment and Recycling

Bayshore Soil Management, LLC hereby acknowledges

The Treatment

Of 385.04 tons of

Petroleum Contaminated Soil
(Received on 7/29/11)

From the **Port Reading Refinery, Port Reading, NJ**

Bayshore Soil Management, LLC.

August 1, 2011
AIR: Facility ID Number 18437; Permit PCP100001
CLASS B: Facility ID Number 132397: Permit CBG090002
Keasbey, New Jersey

Certificate Number 2711-327-072911

7104

10)

Acknowledgment of Treatment and Recycling

Bayshore Soil Management, LLC hereby acknowledges

The Treatment

Of 65.76 tons of

Petroleum Contaminated Soil
(Received on 8/2/11)

From the **Port Reading Refinery, Port Reading, NJ**

Bayshore Soil Management, LLC.

August 3, 2011
AIR: Facility ID Number 18437; Permit PCP100001
CLASS B: Facility ID Number 132397: Permit CBG090002
Keasbey, New Jersey

Certificate Number 2711-327-080211

36)

57155

Acknowledgment of Treatment and Recycling

Bayshore Soil Management, LLC hereby acknowledges

The Treatment

Of 355.45 tons of

Petroleum Contaminated Soil
(Received on 8/3/11)

From the **Port Reading Refinery, Port Reading, NJ**

Bayshore Soil Management, LLC.

August 4, 2011
AIR: Facility ID Number 18437; Permit PCP100001
CLASS B: Facility ID Number 132397: Permit CBG090002
Keasbey, New Jersey

Certificate Number 2711-327-080311

.00067706

088

Acknowledgment of Treatment and Recycling

Bayshore Soil Management, LLC hereby acknowledges

The Treatment

Of 169.38 tons of

Petroleum Contaminated Soil
(Received on 8/4/11)

From the **Port Reading Refinery, Port Reading, NJ**

Bayshore Soil Management, LLC.

August 5, 2011
AIR: Facility ID Number 18437; Permit PCP100001
CLASS B: Facility ID Number 132397: Permit CBG090002
Keasbey, New Jersey

Certificate Number 2711-327-080411

Appendix XII

NJDEP Correspondence - February 24, 1988

1988 FEB 29 A 8

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF WATER RESOURCES
CN 029
TRENTON, NEW JERSEY 08625

GEORGE G. McCANN, P.E.
DIRECTOR

DIRK C. HOFMAN
DEPUTY DIRECT

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

FEB 2 4 1988

Mr. John Steinhauer, Refinery Manager
Amerada Hess (Port Reading) Corporation
P.O. Box 6950
Woodbridge, NJ 07095

RE: Closure of Aeration Basins-letter of 16 February 1988

Dear Mr. Steinhauer:

The Department has reviewed your letter of 16 February 1988 detailing the closure activity for the east bay of the aeration basin. The Department approves of the methods used to delineate the additional contaminated soils and agrees that, once the remaining six yd^3 are removed as proposed, all soils of concern (with >200ppm Cr) will have been removed from the basin area and that those areas with >100 ppm Cr have been identified in the property deed.

The Department approves of the installation of the underdrain system with the diaphragm pump water removal system as recommended by GMS and Associates (letter of February 3, 1988) and described in your letter of February 16, 1988.

The Department also approves of the initiation of the placement of catalyst clays into the northern end of the east bay of the areation basin.

If you have any questions please contact Henry Schuver of the Ground Water Quality Control Section, at (609) 292-8427.

Sincerely,

Elizabeth Fernandez-Obregon for

Kenneth Siet, Section Chief,
Ground Water Quality Control

WQM239

C: Dr. T. Helfgott, Amerada Hess
Mr. Larry Karmel, Amerada Hess

Appendix XIII

Hess Correspondence - May 28, 1987

G
M & ASSOCIATES
S
ENVIRONMENTAL & ENGINEERING SERVICES
11281 RICHMOND AVE.
BUILDING J, SUITE 100B
HOUSTON, TEXAS 77082-2617

May 28, 1987

Mr. Paul Rubbe
Environmental Coordinator
Amerada Hess (Port Reading) Corporation
750 Cliff Road
Port Reading, New Jersey 07064

Subject: Soil Samples from the Aeration Basins & Discussion of Statistical Significance of Test Results

Dear Mr. Rubbe:

On April 3, 1987, GMS & Associates sampled the three aeration basins at the Port Reading refinery. Ten soil samples were collected from immediately below the synthetic liner of the aeration basin. The sample locations are indicated on the attached drawing which is from the approved closure plan. As noted in the attached results, the lead levels were all below expected ranges; however, the chromium values in three of the ten soil samples were statistical outliers. Subsequently, Amerada Hess re-sampled these three locations at a slightly greater depth, approximately two feet below the liner. The re-test results document lower chromium levels for the three sampled areas and illustrates the non-migration of these metals. As demonstrated by the attached results, chromium and lead do not migrate in such soils due to its holding capacity (adsorption and ion exchange) that attenuates these insoluble metals.

The mean concentrations of chromium and lead, including the statistical outliers, for the thirteen soil samples have been calculated and are as follows:

- o 82 mg/kg for total chromium
- o 29 mg/kg for lead

If the three statistical outlier values of the chromium are excluded from the above calculations, the total chromium mean would be less than 36 mg/kg. It should be noted that analyses for hex-chromium, the soluble ion species of this metal, were conducted on the three re-test samples and were below the detection limit.

Mr. Paul Rubbe
May 28, 1987
Page Two

GMS & Associates believes that the soils under the aeration basin's liner are statistically within the NJDEP decontamination parameter guideline of 100 mg/kg for chromium. Please find enclosed a copy of the data, our statistical evaluation, and a drawing of the aeration basin locating the points where the samples were taken.

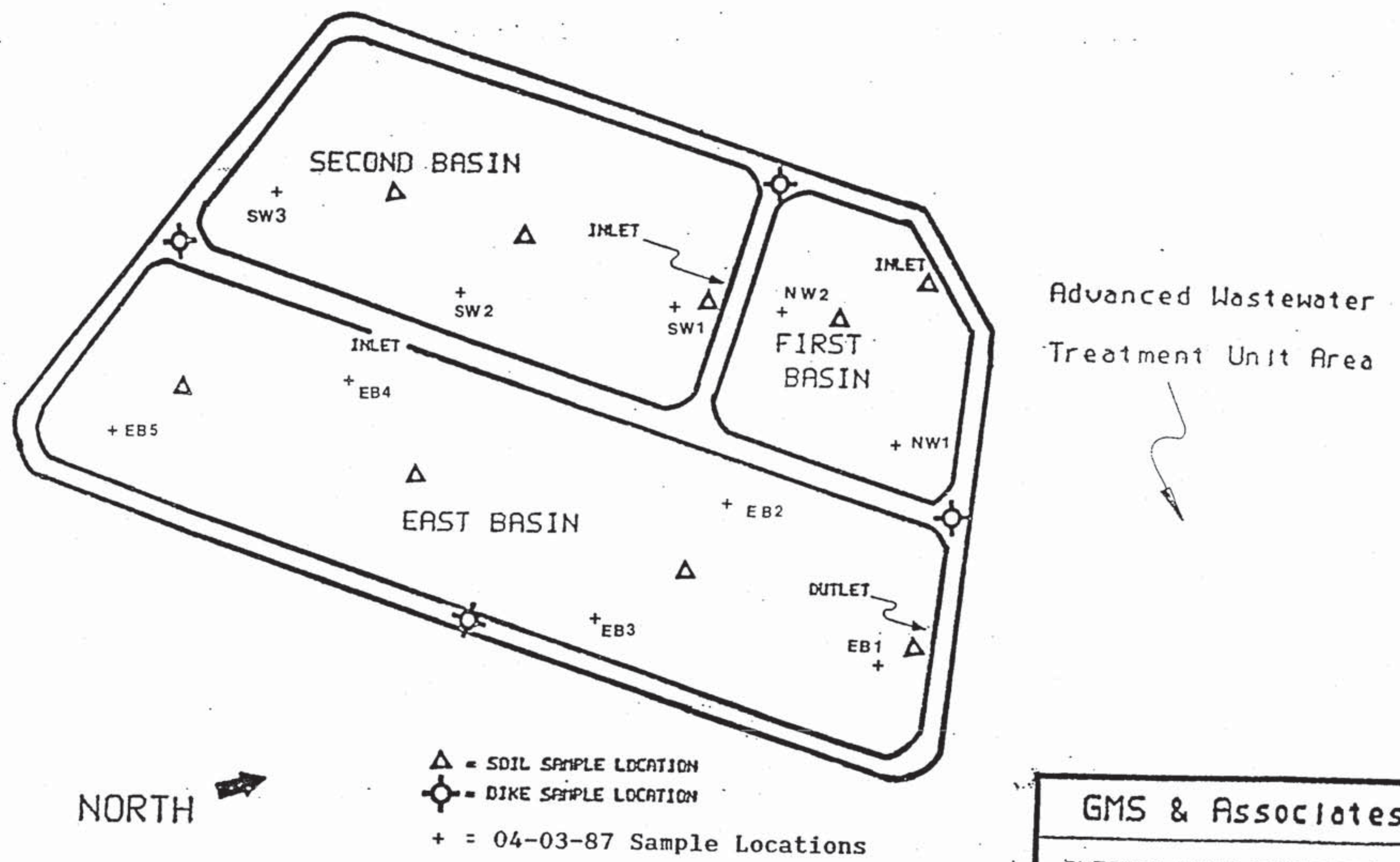
If you have any questions or comments, please feel free to call.

Yours very truly,

GMS and Associates

Rex D. Meyer, R.S.
Principal

cc: Dr. T. Helfgott; AHC - Woodbridge



SAMPLE LOCATIONS FOR DECONTAMINATION OBJECTIVES

GMS & Associates

AMERADA HESS CORPORATION
PORT READING REFINERY
AERATION BASINS CLOSURE

Attachment No.5 Date:6/28/85

AMERADA HESS (PORT READING) CORP.
AERATION BASIN SOIL SAMPLES

Sample No.	Total Chromium (mg/kg)	Hex Chromium (mg/kg)	Lead (mg/kg)
EAST BASIN STATIONS			
EB-1	17	Not Tested	21
EB-2	64	Not Tested	35
EB-3	61	Not Tested	14
EB-4	18	Not Tested	13
EB-5	294	Not Tested	84
EB-5 RETEST	12	<0.1	9
SOUTHWEST BASIN STATIONS			
SW-1	15	Not Tested	11
SW-2	257	Not Tested	69
SW-2 RETEST	3.4	<0.1	2.7
SW-3	130	Not Tested	23
NORTHWEST BASIN STATIONS			
NW-1	20	Not Tested	50
NW-2	161	Not Tested	31
NW-2 RETEST	18	<0.2	12
MEAN	82.33846	<0.2	28.82307
Mean w/o 3 Statistical Outliers	35.84	-	-
VARIANCE	8977.343	NA	568.5602
DEV'TION	94.74884	NA	23.84450

Appendix XIV

Hess Comprehensive Management Plan- Chapter 6- December 3, 2001

CHAPTER 6 - AERATION BASINS

6.1 BACKGROUND

Amerada Hess Corporation operated the Port Reading refinery until 1974 at which time the refinery was placed in a standby mode of operation while terminal operations were continued. To operate as a terminal, the refinery wastewater system was modified to treat stormwater run-off, which required a modification of the NJPDES wastewater discharge permit. Three synthetically lined aeration basins were used for biological treatment of process wastewater and stormwater for refinery operations and then as final polishing ponds for terminal stormwater run-off. These lined aeration basins began receiving treated stormwater from the existing API separator and the corrugated plate separators (used to capture free oil and collect petroleum hydrocarbons from the terminal operations) in 1974.

In 1983, Amerada Hess Corporation applied for a revised NJPDES permit to restart the refinery operations. During 1985, ownership of the refinery site and assets had been transferred from Amerada Hess Corporation to AH(PR)C. An Advanced Industrial Wastewater Treatment System (AWTS) of "state-of-the-art" design was placed in service prior to re-activation of refinery in early 1985, thus replacing the aeration basins. On December 31, 1999 AH(PR)C was merged with and into AHC.

6.2 GENERAL DESCRIPTION

The three basins are adjoining as can be seen in Figure 6.1. The aeration basins are located in the southeast corner of the Port Reading refinery immediately southwest of the refinery's wastewater treatment system. The basins are parallel to the southeast fence line adjoining the Public Service Electric and Gas Company (PSE&G) property and are immediately south of the AWTS.

The total surface area of the three basins is approximately 4.1 acres, including the surrounding dike areas. During their operational period, the three ponds had a combined surface water area of approximately 3.7 acres, an average water depth capacity of 8 feet, and an average above grade dike of four feet. These basins were interconnected and operated in series with the first basin receiving the separator liquid effluents. The first basin is the smallest of the three basins with a surface area of approximately one third of an acre. The effluent from this basin entered the adjoining second basin to the south by a submerged 24 inch pipe. The second basin had a surface water area of 1.2 acres. The effluent from this pond entered the third basin to the east by a submerged 24 inch pipe. The east basin is the largest with a surface area of approximately 2.1 acres.

Wells located in the vicinity of the basins (see Figure 6.1) were gauged during September 1998. The fluid levels measured in these wells are presented on Table 6.1. Figures 6.2 and 6.3 are a groundwater potentiometric map and hydrocarbon isopach map, respectively, generated from September 1998 gauging data.

6.3 REGULATORY SUMMARY

At the time RCRA regulations became effective the aeration basins received only stormwater after it had been treated in the API and the corrugated plate separators (oily water separator devices in connected series). Since these basins only received treated stormwater, they did not meet the definition of Treatment, Storage or Disposal (TSD) facilities under RCRA.

The AHC-PR HSWA permit designates a number of site facilities as SWMUs. Units identified by the U.S. EPA, as part of a RCRA Facility assessment conducted at the Port Reading site on July 24, 1986, include the three aeration basins

The AWTS includes an API oil/water separator, corrugated plate separators, above ground equalization/surge tank, and an above grade activated sludge/clarifier system with final treatment by sand filtration and activated carbon adsorption. All of these treatment units are situated on concrete pads or are concrete basins. The NJDEP approved the permit application and issued a revised NJPDES permit to the Port Reading refinery. Since the modified wastewater treatment system included an above-ground activated sludge wastewater treatment system which replaced the aeration basins, the existing lined aeration basins were no longer needed. Therefore, the NJDEP required submittal of a closure plan for the aeration basins as part of the final NJPDES Port Reading refinery groundwater monitoring/landfarming Permit No. NJ0028878.

On the basis of the substantial data available on the aeration basins, the HSWA permit did not require any additional site investigation but stipulated quarterly status reports regarding closure.

6.4 CLOSURE STATUS

During closure activities for the Aeration Basins, approximately 1,000 cubic yards of sediments and detritus from the east basin have been moved to the No. 1 Landfarm. The synthetic liner in this basin was removed before excavating the underlying soils. Soils beneath the liner exceeding the closure criteria (see table below) were removed prior to the addition of catalyst fill material. The underlying soils at the east basin have been tested and shown to meet the NJDEP approved decontamination objectives , as shown below .

East Basin Closure Criteria

Constituent	Closure Levels if CEC < 5 mg/kg	Closure Levels if CEC 5-15 mg/kg	Closure Levels if CEC > 15 mg/kg
Lead	125.5 ppm	250 ppm	500 ppm
Chromium	100 ppm	100 ppm	100 ppm
Oil and Grease	4000 ppm	4000 ppm	4000 ppm

CEC - Cation Exchange Capacity
NA - None Applicable

AHC-PR re-sampled the subsoil of the East aeration basin, in accordance with NJDEP correspondence of January 21, 1988 (Attachment 6.3). At total of six soil grab samples were collected, approximately 150 feet apart. One of the soil samples (Soil core #5) indicated that Total Chromium was detected above 200 mg/Kg (dry weight). Therefore, 8 additional soil samples were collected to determine the actual size of the area requiring removal. AHC-PR removed approximately 6 cubic yards (to a depth of 1 foot) of soil (Attachment 6.4).

It has been noted that groundwater elevation is higher than the aeration basin bottom elevation. Therefore, groundwater flow is into the aeration basins. A permanent underdrain and pumping system has been installed within the east basin to collect the water accumulating in the bottom of the basin. This water is pumped to the AWTS for treatment. Attachment 6.1 is schematic drawings of the underdrain and pump system. Attachment 6.2 is a February 24, 1988 letter from the NJDEP to AHC-PR approving the installation of the underdrain system with a diaphragm pump. This letter demonstrates NJDEP approval for the initiation of catalyst fine placement within the east bay of the aeration basins. The synthetic liners are still in place within the two smaller basins. The liners prevent fluid flow into, or out of, these basins. Standing water within the two smaller basins is periodically pumped manually to the process sewer system utilization an above ground diaphragm "trash" pump.

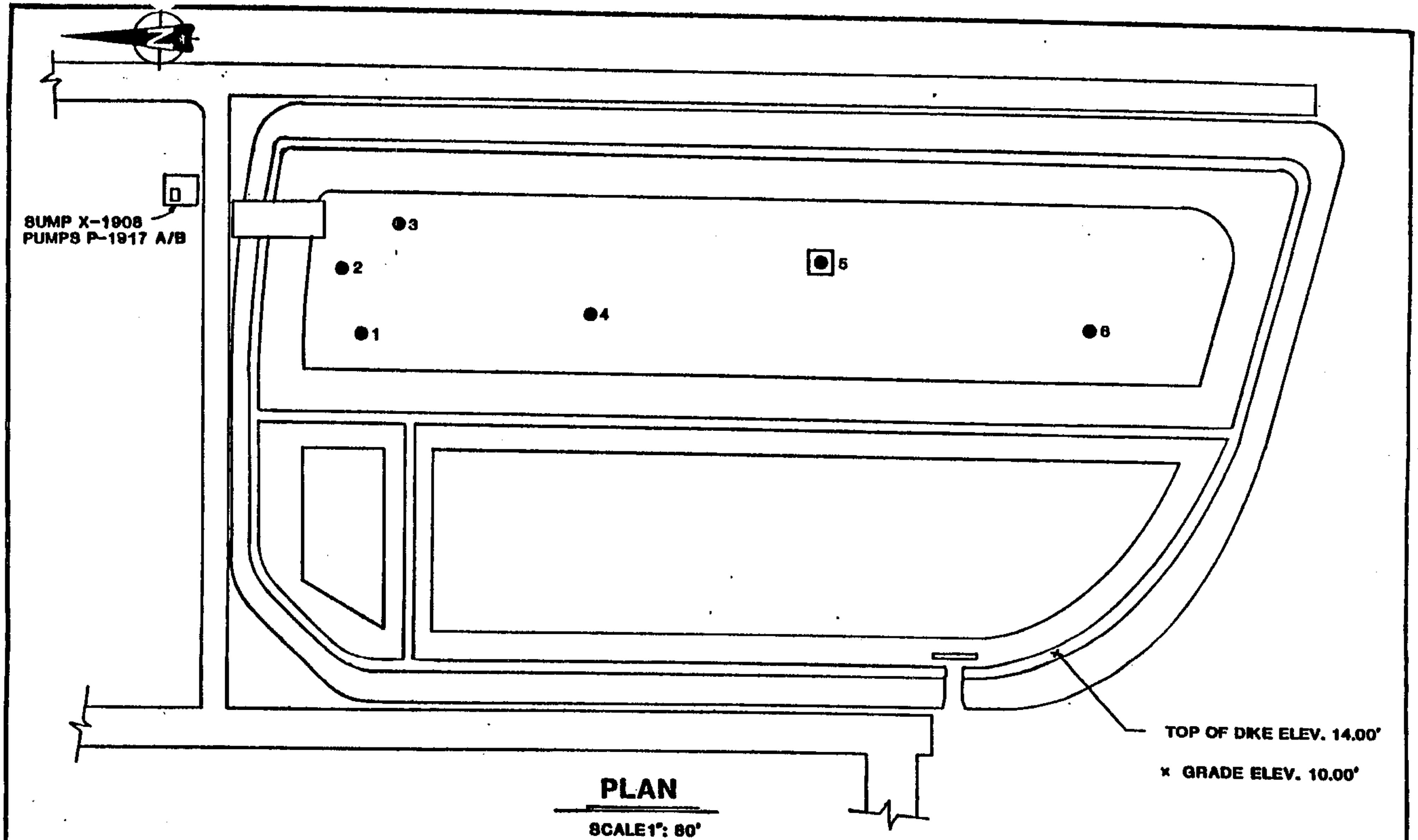
As of October 1998, approximately 13,165 cubic yards, of dewatered stabilized catalyst have been placed (as approved by NJDEP) in the East Basin. The estimated amount of catalyst fines required to fill all three Aeration Basins to the final grade is 30,000 cubic yards. When the East Basin is filled, dewatered catalyst fines will then be placed in the southwest and northwest basins. Once the basins are all filled, the entire aeration basin area will be covered with soil and shaped to a one percent slope. A final cover of top soil will be added and seeded with grass to control erosion. The East Basin is approaching full capacity of catalyst fines. AHC-PR is currently evaluating closure requirements for the smaller basins.

6.5 CORRECTIVE ACTION PLAN

Water accumulating in the aeration basins (from rainfall or seepage from groundwater) will continue to be pumped to the refinery AWTS.

AHC-PR proposes to install four new groundwater monitoring wells, AB-1 through AB-4, located as shown in Figure 6.4. A baseline groundwater sampling event will be conducted to assess the impact of the aeration basins and the potential for movement of any constituents; samples will be analyzed for TCL+30/TAL, TPHC, and pH in accordance with N.J.A.C. 7:26E-2.1(c)2. Groundwater samples will be collected in accordance with "The NJDEP Field Sampling Procedure Manual". During initial groundwater sampling, groundwater monitoring wells will be purged 3-5 well volumes at a purge rate of 2 gpm or less, in order to minimize the drawdown in the monitoring wells. After characterization has been achieved and dependent on the initial sample data AHC-PR may request to use low flow sampling methodology of the NJDEP.

The four proposed new wells (AB-1 through AB-4) in conjunction with existing PL-wells (specifically PL-2, PL-4, PL-5, PL-8, and PL-9), will provide a suitable network of groundwater monitoring points for determining groundwater flow in the vicinity of the Aeration Basins. The Colonial Pipeline wells will provide groundwater quality data upgradient of the Aeration Basins and proposed wells AB-1 through AB-4 will provide groundwater quality downgradient of the Aeration Basins. The Aeration Basins were constructed with synthetic liners. The liners are still in place within the two smaller basins and groundwater flows into the larger east bay where it is removed using the NJDEP approved drain and pump system. Therefore, there is little probability that the Aeration Basins have affected groundwater quality in the area. It should be noted that benzene has been detected in wells PL-4 and PL-5 and toluene has been detected in PL-5 during prior sampling events. The presence of these constituents in PL-4 and PL-5 is most likely the result of the Colonial Pipeline release. The presence of benzene and toluene in these wells does not represent an impact to groundwater from the Aeration Basins since PL-4 and PL-5 are upgradient of the Aeration Basins.



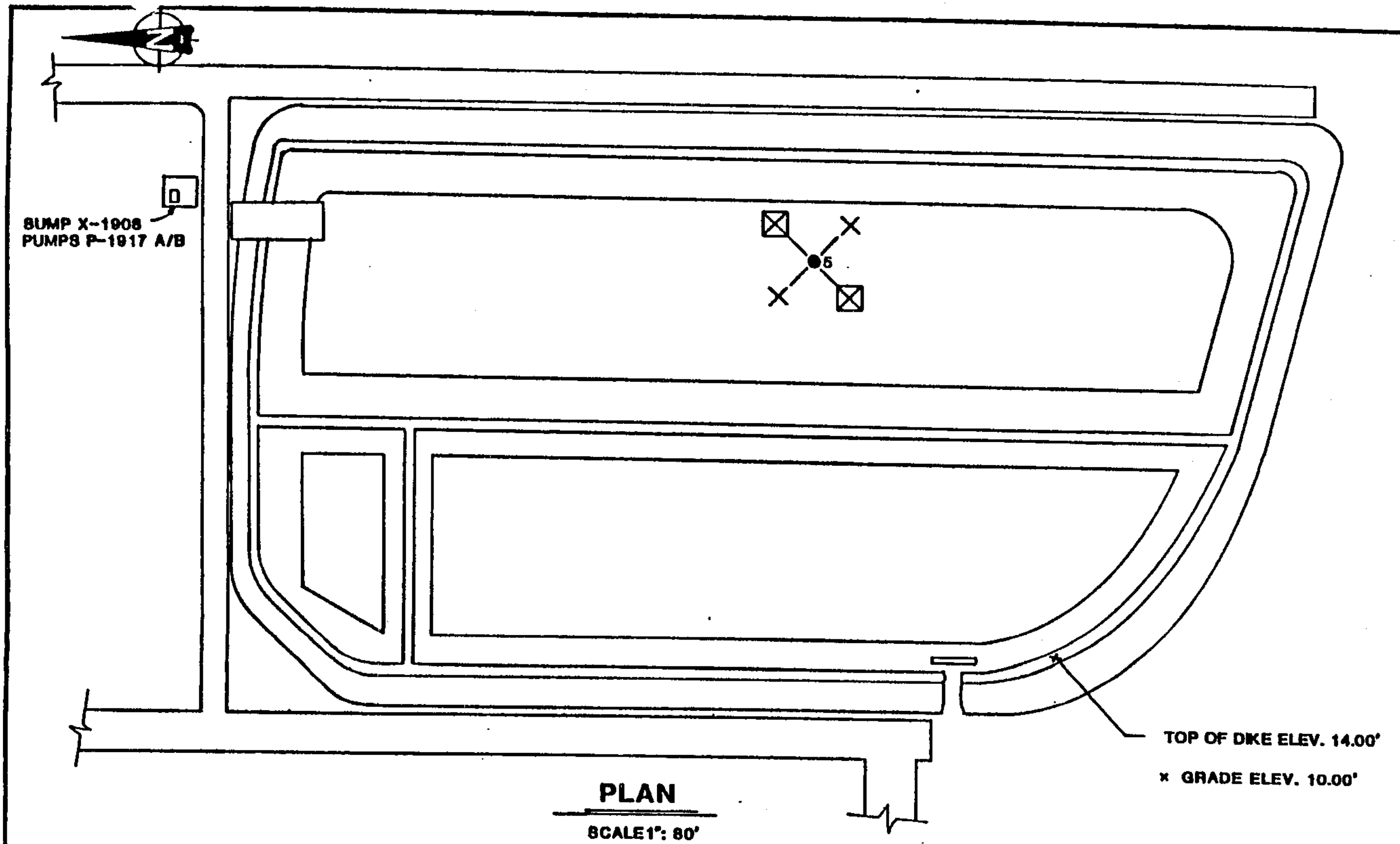
PLAN

SCALE 1": 80'

- ● SOIL GRABS BELOW 200 PPM DRY WEIGHT BASIS FOR TOTAL CHROMIUM.
- ⊡ SOIL GRAB ABOVE 200 PPM CHROMIUM (DRY WEIGHT BASIS).

ALL SOIL CORES ARE 0–6" IN DEPTH

SKETCH 1



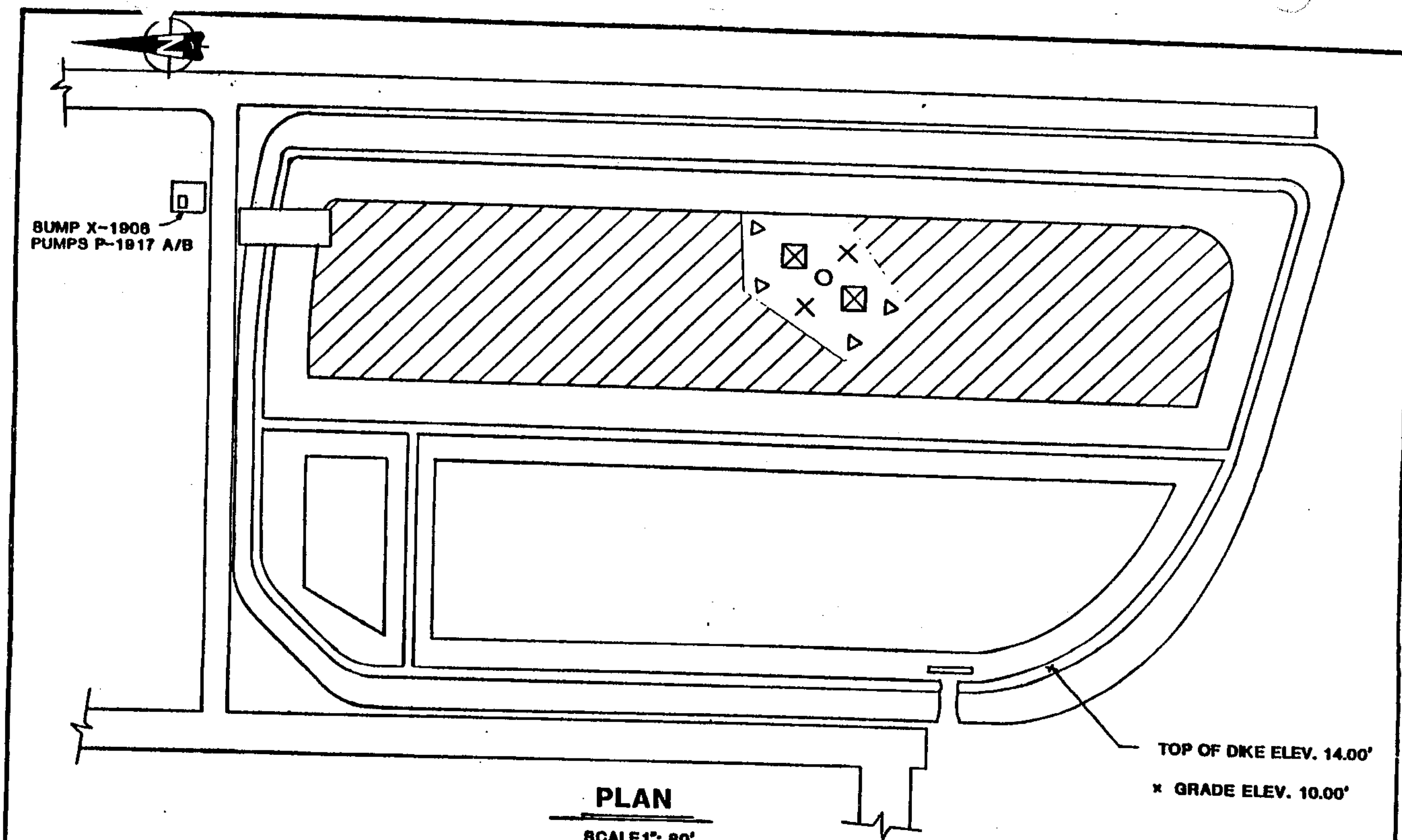
SOIL GRAB RESAMPLE BELOW 200 PPM CHROMIUM (DRY WEIGHT BASIS).

SOIL GRAB RESAMPLE ABOVE 200 PPM CHROMIUM (DRY WEIGHT BASIS).

2 FEET FROM ORIGINAL SOIL SAMPLE

ALL SOIL CORES ARE 0-6" IN DEPTH.

SKETCH 2

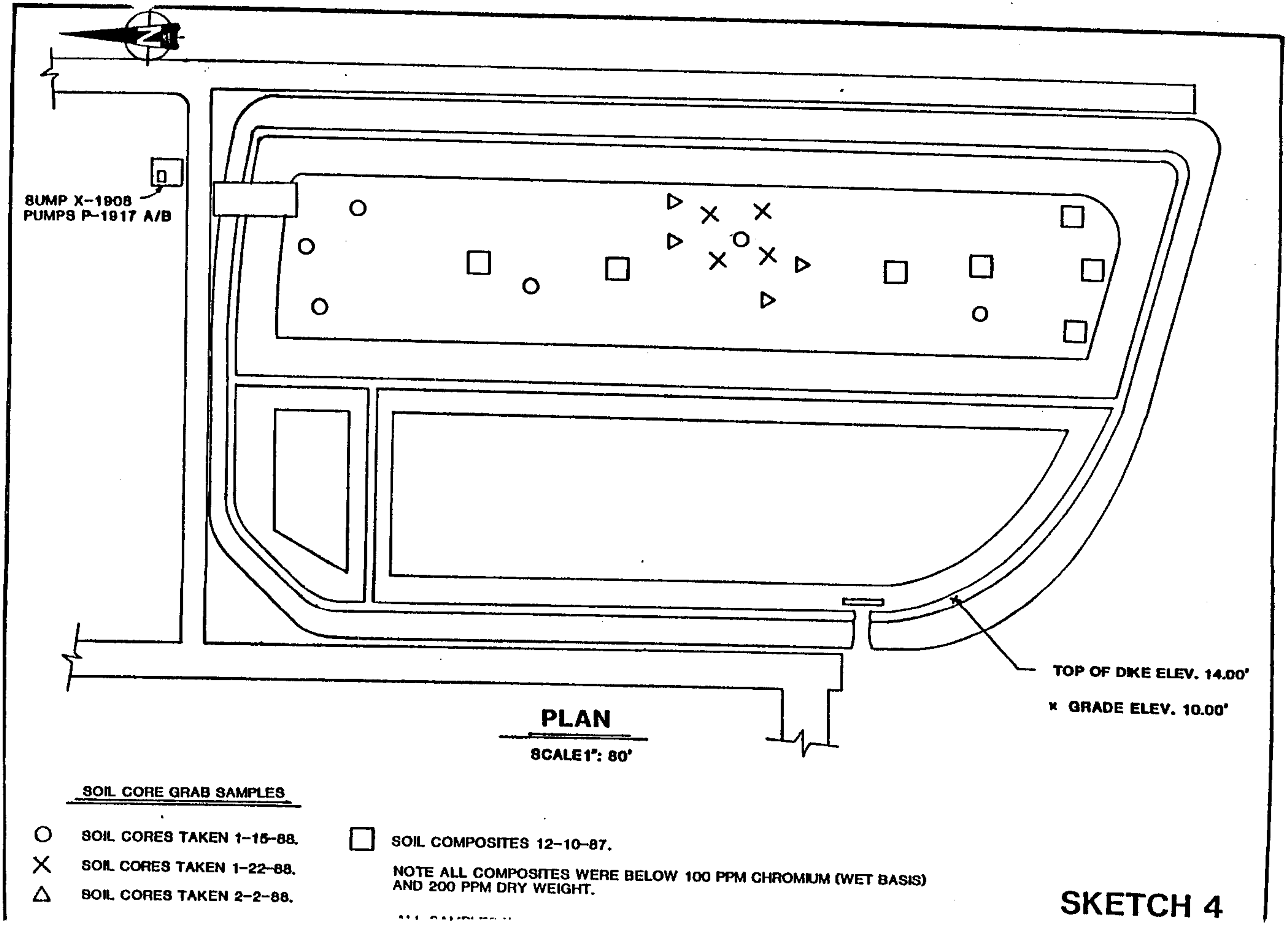


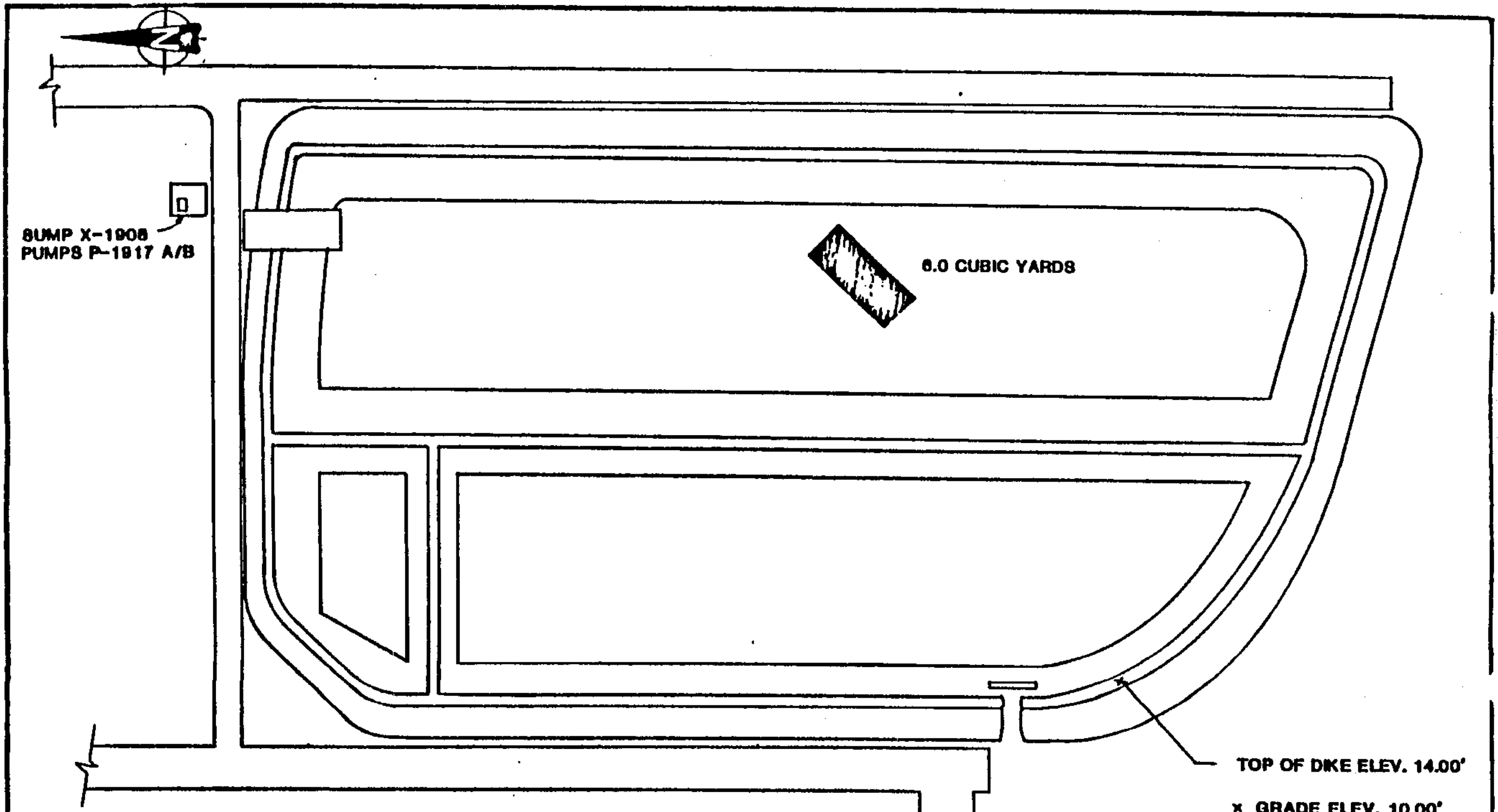
PLAN

SCALE1": 80'

○ ORIGINAL SOIL CORE ABOVE 200 PPM CHROMIUM.
× RESAMPLE BELOW 200 PPM CHROMIUM.
⊠ RESAMPLE ABOVE 200 PPM CHROMIUM.
△ RESAMPLE BELOW 200 PPM CHROMIUM.
▨ AREA BELOW 200 PPM CHROMIUM.
ALL SOIL CORES ARE 0-6" IN DEPTH

SKETCH 3


SUMP X-1908
PUMPS P-1917 A/B
TOP OF DIKE ELEV. 14.00'
× GRADE ELEV. 10.00'
PLAN
SCALE 1": 80'
SOIL CORE GRAB SAMPLES
○ SOIL CORES TAKEN 1-15-88.
✕ SOIL CORES TAKEN 1-22-88.
△ SOIL CORES TAKEN 2-2-88.
□ SOIL COMPOSITES 12-10-87.
NOTE ALL COMPOSITES WERE BELOW 100 PPM CHROMIUM (WET BASIS) AND 200 PPM DRY WEIGHT.
SKETCH 4



PLAN

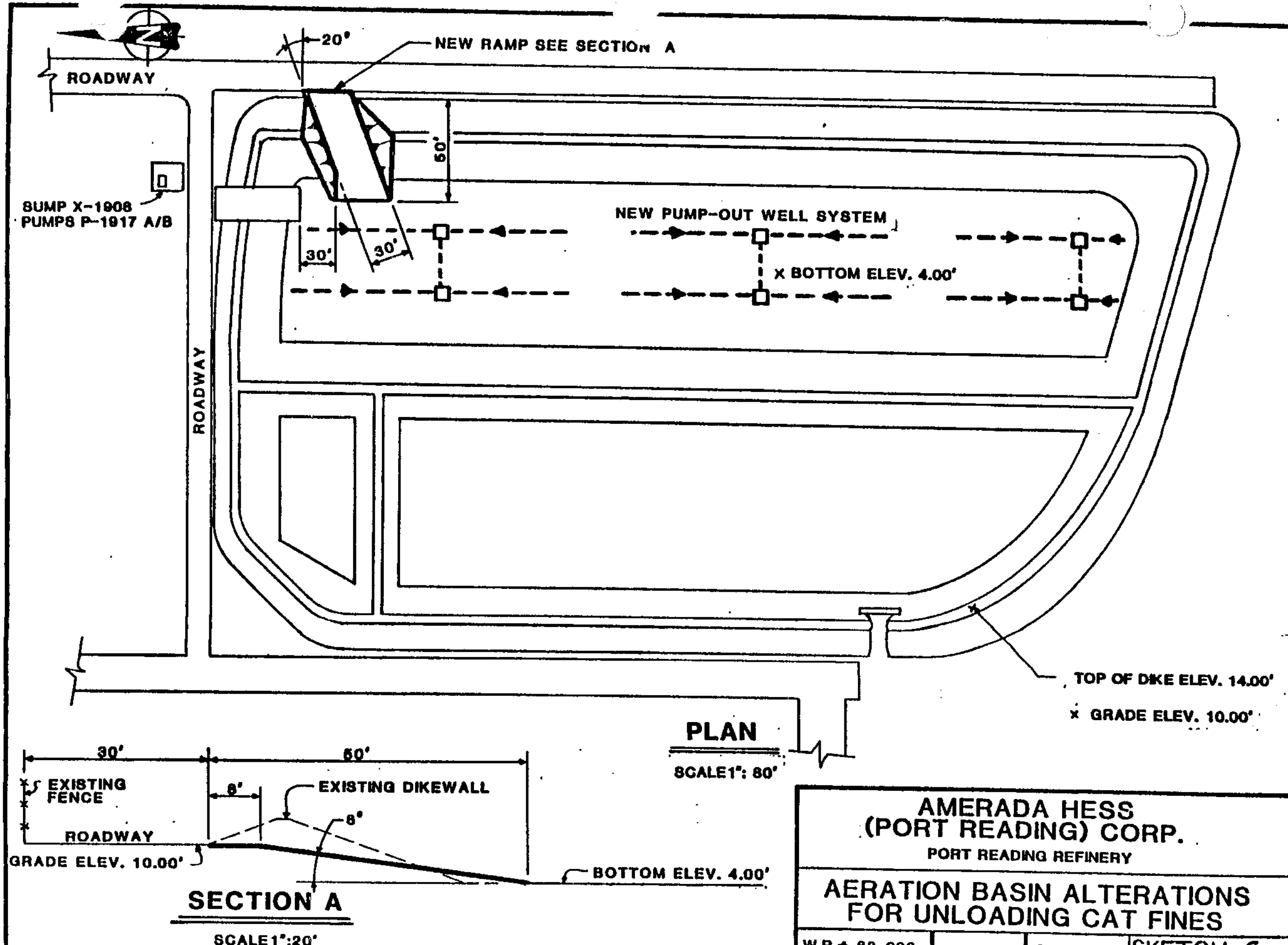
SCALE1": 80'

AREA ABOVE 200 PPM CHROMIUM TO BE REMOVED FOR FUTURE APPLICATION TO NO. 1 LANDFARM AFTER MARCH 15,1988.

REQUIRED VOLUME TO BE REMOVED – 2.0 CUBIC YARDS.

ACTUAL VOLUME TO BE REMOVED– 6.0 CUBIC YARDS.

SKETCH 5



AMERADA HESS
(PORT READING) CORP.
PORT READING REFINERY

AERATION BASIN ALTERATIONS
FOR UNLOADING CAT FINES

W.R.# 88-006		DWG. NO.	SKETCH 6

Appendix XV

Basin Soil Analytical Data Package- November 1, 2013

From:	Jamie Yakes
To:	Dave Carlson, LSRP
Cc:	Shirley Grzybowski; Michelle O"Brien
Subject:	RE: Hex Chrome LIMS Report (jb51845rt)
Attachments:	jb51845r_ehph-raw.pdf 3060a.pdf

Dave:-

Your sample is greatly reducing, as indicated by the redox graph (attached), and the failure of most matrix spikes and post-spikes. The reducing environment was significant enough to reduce spiked Cr-6+ to Cr-3+, and probably consumed any native Cr-6+ that existed prior to digestion.

Performing the secondary tests (TOC, sulfide, and ferric iron), will allow you to better determine what reducing agents are present in your sample, such as metals, suflides, or organic acids.

I've attached a copy of method 3060A. Refer to section 8.5 for information on spike recoveries.

And please contact me if you have more questions.

Jamie Yakes

Jamie J. Yakes
Inorganic Chemistry Manager
Accutest Laboratories Corporation--New Jersey
Office: 732-329-0200 x1512 | Mobile: 908-421-5493
jamiey@accutest.com
www.accutest.com

-----Original Message-----
From: Michelle O'Brien
Sent: Tuesday, November 19, 2013 9:55 AM
To: Jamie Yakes; Shirley Grzybowski
Subject: Hex Chrome LIMS Report (jb51845rt)

Good Morning,

Would you be able to help Dave Carlson from EnviroTrac in regards to his questions on Hex Chrome analysis below? I am not 100% positive on what I should advise him to do.

Thank you for your help!

Michelle O'Brien
Accutest Laboratories
Office | (732) 329-0200, ext 1207

-----Original Message-----
From: Dave Carlson, LSRP [mailto:davec@envirotrac.com]
Sent: Friday, November 15, 2013 5:01 PM
To: Michelle O'Brien
Cc: Sarah Dyson; Philip Kunkle
Subject: RE: Hex Chrome LIMS Report (jb51845rt qgen01)

Michelle,

Thanks for that explanation sheet - it did really explain what was going on. We want to run the next step - Ferrous Iron, Sulfide and Total Organic Carbon- even though the sulfide is out of hold. Perhaps you can answer this - when this next step is done will I be able to say.....

1) the sample yielded X mg/kg of hex chrome but had QC issues, and
2) the Ferrous Iron, Sulfide and Total Organic Carbon are indicative of oxidizing/reducing conditions that would/would not tend to shift chromium valences toward hexchrome.

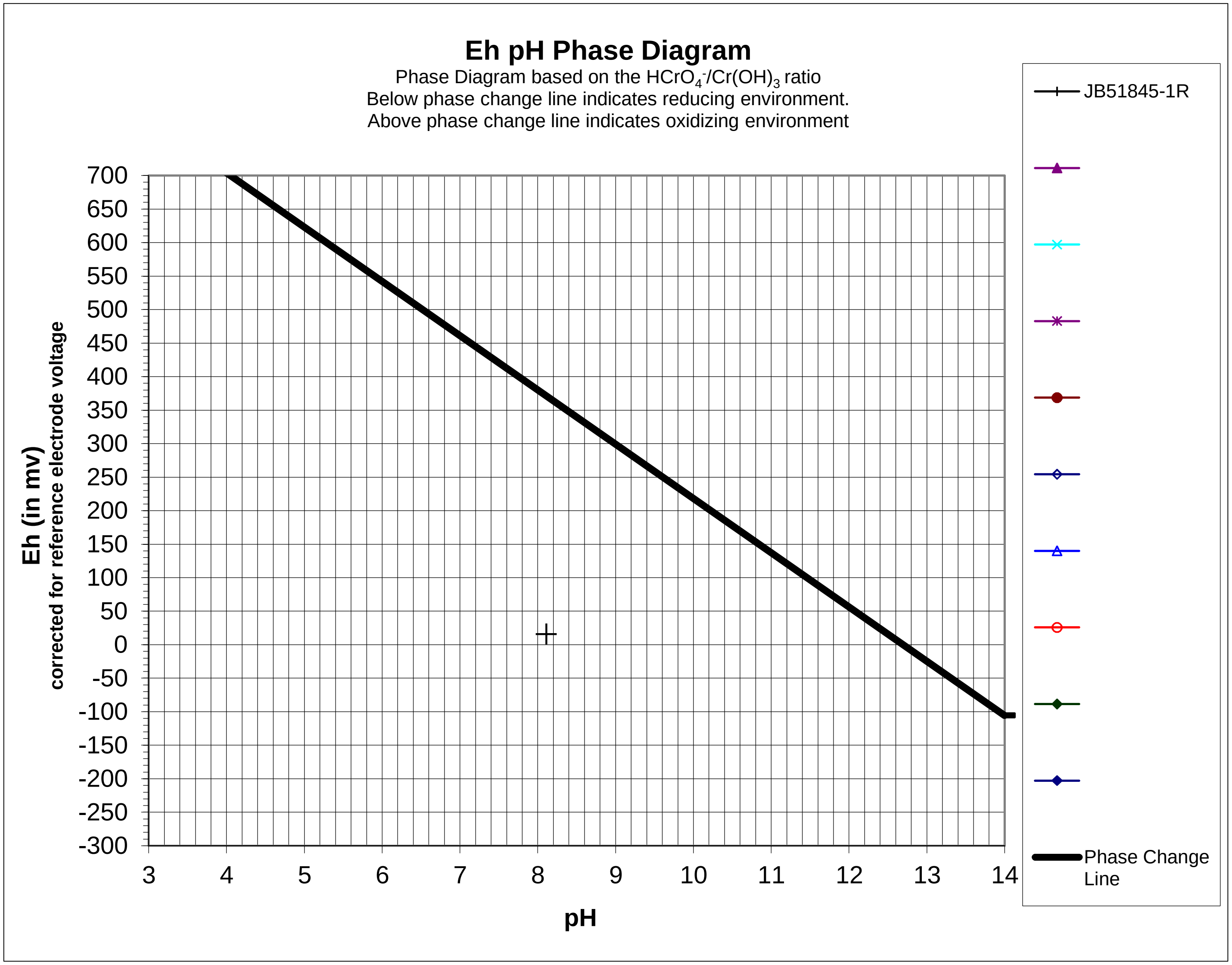
I am a mere geologist. Any chemist who wants to circle the correct answers feel free. Perhaps the correct answers are to be had only after the next step. By the way - we have until Wednesday to get a fresh sample from this approximate location - I don't want to go for chrome again but would a field/fresh soil pH or ORP be useful in interpreting the meaning of our results?

Thank you,

Dave

	pH	eH (MV)
Phase Change Line	0	1027.7
	14	-105.6

Sample Number	pH	eH (mv)
JB51845-1R	8.11	15.8



Note that the Eh values plotted on this diagram are corrected for the reference electrode voltage and the values shown are versus the standard hydrogen electrode

Reference for graph: SW846 method 3060A

METHOD 3060A

ALKALINE DIGESTION FOR HEXAVALENT CHROMIUM

1.0 SCOPE AND APPLICATION

1.1 Any reference in this method to "Method 3060" refers to this version of that method, and does not refer to previously published versions (e.g., in the Second Edition of this manual). When published as a new method to SW-846, a method's number does not include a letter suffix. Each time a method is revised and made a part of SW-846 update, it receives a suffix. However, a method reference found within the text of SW-846 methods always refers to the latest version of that method published in SW-846, even if the method number at that location does not include the appropriate letter suffix.

1.2 Method 3060 is an alkaline digestion procedure for extracting hexavalent chromium [Cr(VI)] from soluble, adsorbed, and precipitated forms of chromium compounds in soils, sludges, sediments, and similar waste materials. To quantify total Cr(VI) in a solid matrix, three criteria must be satisfied: (1) the extracting solution must solubilize all forms of Cr(VI), (2) the conditions of the extraction must not induce reduction of native Cr(VI) to Cr(III), and (3) the method must not cause oxidation of native Cr(III) contained in the sample to Cr(VI). Method 3060 meets these criteria for a wide spectrum of solid matrices. Under the alkaline conditions of the extraction, minimal reduction of Cr(VI) or oxidation of native Cr(III) occurs. The addition of Mg^{2+} in a phosphate buffer to the alkaline solution has been shown to suppress oxidation, if observed. The accuracy of the extraction procedure is assessed using spike recovery data for soluble and insoluble forms of Cr(VI) (e.g., $K_2Cr_2O_7$ and $PbCrO_4$), coupled with measurement of ancillary soil properties, indicative of the potential for the soil to maintain a Cr(VI) spike during digestion, such as oxidation reduction potential (ORP), pH, organic matter content, ferrous iron, and sulfides. Recovery of an insoluble Cr(VI) spike can be used to assess the first two criteria, and method-induced oxidation is usually not observed except in soils high in Mn and amended with soluble Cr(III) salts or freshly precipitated $Cr(OH)_3$.

1.3 The quantification of Cr(VI) in Method 3060 digests should be performed using a suitable technique with appropriate accuracy and precision, for example Method 7196 (colorimetrically by UV-VIS spectrophotometry) or Method 7199 (colorimetrically by ion chromatography (IC)). Analytical techniques such as IC with inductively coupled plasma - mass spectrometric (ICP-MS) detection, high performance liquid chromatography (HPLC) with ICP-MS detection, capillary electrophoresis (CE) with ICP-MS detection, etc. may be utilized once performance effectiveness has been validated.

2.0 SUMMARY OF METHOD

2.1 This method uses an alkaline digestion to solubilize both water-insoluble (with the exception of partial solubility of barium chromate in some soil matrices, see Reference 10.9) and water soluble Cr(VI) compounds in solid waste samples. The pH of the digestate must be carefully adjusted during the digestion procedure. Failure to meet the pH specifications will necessitate redigestion of the samples.

2.2 The sample is digested using 0.28M Na_2CO_3/0.5M NaOH solution and heating at 90-95°C for 60 minutes to dissolve the Cr(VI) and stabilize it against reduction to Cr(III).

2.3 The Cr(VI) reaction with diphenylcarbazide is the most common and reliable method for analysis of Cr(VI) solubilized in the alkaline digestate. The use of diphenylcarbazide has been well established in the colorimetric procedure (Method 7196), in rapid-test field kits, and in the ion chromatographic method for Cr(VI) (Method 7199). It is highly selective for Cr(VI) and few interferences are encountered when it is used on alkaline digestates.

2.4 For additional information on health and safety issues relating to chromium, refer to References 10.7 and 10.10.

3.0 INTERFERENCES

3.1 When analyzing a sample digest for total Cr(VI), it is appropriate to determine the reducing/oxidizing tendency of each sample matrix. This can be accomplished by characterization of each sample for additional analytical parameters, such as pH (Method 9045), ferrous iron (ASTM Method D3872-86), sulfides (Method 9030), and Oxidation Reduction Potential (ORP) (ASTM Method D 1498-93 - aqueous samples). Method 9045 (Section 7.2 of Method 9045) is referenced as the preparatory method for soil samples. The ORP and temperature probes are inserted directly into the soil slurry. The displayed ORP value is allowed to equilibrate and the resulting measurement is recorded. Other indirect indicators of reducing/oxidizing tendency include Total Organic Carbon (TOC), Chemical Oxygen Demand (COD), and Biological Oxygen Demand (BOD). Analysis of these additional parameters establishes the tendency of Cr(VI) to exist or not exist in the unspiked sample(s) and assists in the interpretation of QC data for matrix spike recoveries outside conventionally accepted criteria for total metals.

3.2 Certain substances, not typically found in the alkaline digests of soils, may interfere in the analytical methods for Cr(VI) following alkaline extraction if the concentrations of these interfering substances are high and the Cr(VI) concentration is low. Refer to Methods 7196 and 7199 for a discussion of the specific agents that may interfere with Cr(VI) quantification. Analytical techniques that reduce bias caused by co-extracted matrix components may be applicable in correcting these biases after validation of their performance effectiveness.

3.3 For waste materials or soils containing soluble Cr(III) concentrations greater than four times the laboratory Cr(VI) reporting limit, Cr(VI) results obtained using this method may be biased high due to method-induced oxidation. The addition of Mg^{2+} in a phosphate buffer to the alkaline extraction solution has been shown to suppress this oxidation. If an analytical method for Cr(VI) is used that can correct for possible method induced oxidation/reduction, then the Mg^{2+} addition is optional. The presence of soluble Cr(III) can be approximated by extracting the sample with deionized water (ASTM methods D4646-87, D5233-92, or D3987-85) and analyzing the resultant leachate for both Cr(VI) and total Cr. The difference between the two values approximates soluble Cr(III).

4.0 APPARATUS AND MATERIALS

4.1 Digestion vessel: borosilicate glass or quartz with a volume of 250 mL.

4.2 Graduated Cylinder: 100-mL or equivalent.

4.3 Volumetric Flasks: Class A glassware, 1000-mL and 100-mL, with stoppers or equivalent.

4.4 Vacuum Filtration Apparatus.

4.5 Filter membranes (0.45 µm). Preferably cellulosic or polycarbonate membranes. When vacuum filtration is performed, operation should be performed with recognition of the filter membrane breakthrough pressure.

4.6 Heating Device - capable of maintaining the digestion solution at 90-95°C with continuous auto stirring capability or equivalent.

4.7 Volumetric pipettes: Class A glassware, assorted sizes, as necessary.

4.8 Calibrated pH meter.

4.9 Calibrated balance.

4.10 Temperature measurement device (with NIST traceable calibration) capable of measuring up to 100°C (e.g. thermometer, thermistor, IR sensor, etc.).

4.11 An automated continuous stirring device (e.g. magnetic stirrer, motorized stirring rod, etc.), one for each digestion being performed.

5.0 REAGENTS

5.1 Nitric acid: 5.0 M HNO_3, analytical reagent grade or spectrograde quality. Store at 20-25°C in the dark. Do not use concentrated HNO_3 to make up 5.0 M solution if it has a yellow tinge; this is indicative of photoreduction of NO_3^- to NO_2, a reducing agent for Cr(VI).

5.2 Sodium carbonate: Na_2CO_3, anhydrous, analytical reagent grade. Store at 20-25°C in a tightly sealed container.

5.3 Sodium hydroxide: NaOH, analytical reagent grade. Store at 20-25°C in a tightly sealed container.

5.4 Magnesium Chloride: $MgCl_2$ (anhydrous), analytical reagent grade. A mass of 400 mg $MgCl_2$ is approximately equivalent to 100 mg Mg^{2+}. Store at 20-25°C in a tightly sealed container.

5.5 Phosphate Buffer:

5.5.1 K_2HPO_4: analytical reagent grade.

5.5.2 KH_2PO_4: analytical reagent grade.

5.5.3 0.5M K_2HPO_4/0.5M KH_2PO_4 buffer at pH 7: Dissolve 87.09 K_2HPO_4 and 68.04 g KH_2PO_4 into 700 mL of reagent water. Transfer to a 1L volumetric flask and dilute to volume.

5.6 Lead Chromate: $PbCrO_4$, analytical reagent grade. The insoluble matrix spike is prepared by adding 10-20 mg of $PbCrO_4$ to a separate sample aliquot. Store under dry conditions at 20-25°C in a tightly sealed container.

5.7 Digestion solution: Dissolve 20.0 ± 0.05 g NaOH and 30.0 ± 0.05 g Na_2CO_3 in reagent water in a one-liter volumetric flask and dilute to the mark. Store the solution in a tightly capped polyethylene bottle at 20-25°C and prepare fresh monthly. The pH of the digestion solution must be checked before using. The pH must be 11.5 or greater, if not, discard.

5.8 Potassium dichromate, $K_2Cr_2O_7$, spiking solution (1000 mg/L Cr(VI)): Dissolve 2.829 g of dried (105°C) $K_2Cr_2O_7$ in reagent water in a one-liter volumetric flask and dilute to the mark. Alternatively, a 1000 mg/L Cr(VI) certified primary standard solution can be used (Fisher AAS standard or equivalent). Store at 20-25°C in a tightly sealed container for use up to six months.

5.8.1 Matrix spiking solution (100 mg/L Cr(VI)): Add 10.0 mL of the 1000 mg Cr(VI)/L made from $K_2Cr_2O_7$ spiking solution (Section 5.8) to a 100 mL volumetric flask and dilute to volume with reagent water. Mix well.

5.9 Reagent Water - Reagent water will be free of interferences. Refer to Chapter One for a definition of reagent water.

6.0. SAMPLE COLLECTION, PRESERVATION, AND HANDLING

6.1 Samples must have been collected using a sampling plan that addresses the considerations discussed in Chapter Nine of this manual.

6.2 Samples should be collected using devices and placed in containers that do not contain stainless steel (e.g., plastic or glass).

6.3 Samples should be stored field-moist at 4 ± 2°C until analysis.

6.4 Hexavalent chromium has been shown to be quantitatively stable in field-moist soil samples for 30 days from sample collection. In addition, Cr(VI) has also been shown to be stable in the alkaline digestate for up to 168 hours after extraction from soil.

6.5 Hexavalent chromium solutions or waste material that are generated should be disposed of properly. One approach is to treat all Cr(VI) waste materials with ascorbic acid or other reducing agent to reduce the Cr(VI) to Cr(III). For additional information on health and safety issues relating to chromium, the user is referred to References 10.7 and 10.10.

7.0 PROCEDURE

7.1 Adjust the temperature setting of each heating device used in the alkaline digestion by preparing and monitoring a temperature blank [a 250 mL vessel filled with 50 mLs digestion solution (Section 5.7)]. Maintain a digestion solution temperature of 90-95°C as measured with a NIST-traceable thermometer or equivalent.

7.2 Place 2.5 ± 0.10 g of the field-moist sample into a clean and labeled 250 mL digestion vessel. The sample should have been mixed thoroughly before the aliquot is removed.

For the specific sample aliquot that is being spiked (Section 8.5), the spike material should be added directly to the sample aliquot at this point. (Percent solids determination, U.S. EPA CLP SOW for Organic Analysis, OLM03.1, 8/94 Rev.) should be performed on a separate aliquot in order to calculate the final result on a dry-weight basis).

7.3 Add 50 mL ± 1 mL of digestion solution (Section 5.7) to each sample using a graduated cylinder, and also add approximately 400 mg of $MgCl_2$ (Section 5.4) and 0.5 mL of 1.0M phosphate buffer (Section 5.5.3). For analytical techniques that can correct for oxidation/reduction of Cr, the addition of Mg^{2+} is optional. Cover all samples with watch glasses.

7.4 Stir the samples continuously (unheated) for at least five minutes using an appropriate stirring device.

7.5 Heat the samples to 90-95°C, then maintain the samples at 90-95°C for at least 60 minutes with continuous stirring.

7.6 Gradually cool, with continued agitation, each solution to room temperature. Transfer the contents quantitatively to the filtration apparatus; rinsing the digestion vessel with 3 successive portions of reagent water. Transfer the rinsates to the filtration apparatus. Filter through a 0.45µm membrane filter. Rinse the inside of the filter flask and filter pad with reagent water and transfer the filtrate and the rinses to a clean 250-mL vessel.

> NOTE: The remaining solids and filter paper resulting from filtration of the matrix spike in Section 7.6 should be saved for possible use in assessing low Cr(VI) matrix spike recoveries. See Section 8.5.2. for additional details. Store the filtered solid at 4 ± 2°C.

7.7 Place an appropriate stirring device into the sample digest beaker, place the vessel on a stirrer, and, with constant stirring, slowly add 5.0 M nitric acid solution to the beaker dropwise. Adjust the pH of the solution to 7.5 ± 0.5 if the sample is to be analyzed using Method 7196 (adjust the pH accordingly if an alternate analytical method is to be used; i.e. 9.0 ± 0.5 if Method 7199 is to be used) and monitor the pH with a pH meter. If the pH of the digest should deviate from the desired range, discard the solution and redigest. If overshooting the desired pH range occurs repeatedly, prepare diluted nitric acid solution and repeat digestion procedure. If a flocculent precipitate should form, the sample should be filtered through a 0.45 µm membrane filter. If the filter becomes clogged using the 0.45 µm filter paper, a larger size filter paper (Whatman GFB or GFF) may be used to prefilter the samples.

> CAUTION: CO_2 will be evolved. This step should be performed in a fume hood.

7.8 Remove the stirring device and rinse, collecting the rinsate in the beaker. Transfer quantitatively the contents of the vessel to a 100 mL volumetric flask and adjust the sample volume to 100 mL (to the mark for the volumetric flask) with reagent water. Mix well.

7.9 The sample digestates are now ready to be analyzed. Determine the Cr(VI) concentration in mg/kg by a suitable technique with appropriate accuracy and precision, for example Method 7196 (colorimetrically by UV-VIS spectrophotometry) or Method 7199 (colorimetrically by ion chromatography (IC)). Another analytical technique such as IC with inductively coupled plasma - mass spectrometric (ICP-MS) detection, high performance liquid chromatography (HPLC) with ICP-

MS detection, capillary electrophoresis (CE) with ICP-MS detection, etc. may be utilized once performance effectiveness has been validated.

7.10 CALCULATIONS

7.10.1 Sample Concentration

$$\text{Concentration} = \frac{A \times D \times E}{B \times C}$$

where:
A = Concentration observed in the digest (µg/mL)
B = Initial moist sample weight (g)
C = % Solids/100
D = Dilution Factor
E = Final digest volume (mL)

7.10.2 Relative Percent Difference

$$\text{RPD} = \frac{(S - D)}{[(S + D)/2]}$$

where:
S = Initial sample result
D = Duplicate sample result

7.10.3 Spike Recovery

$$\text{Percent Recovery} = \frac{(SSR - SR)}{SA} \times 100$$

where:
SSR = Spike sample result
SR = Sample (unspiked) result
SA = Spike added

8.0 QUALITY CONTROL

8.1 The following Quality Control (QC) analyses must be performed per digestion batch as discussed in Chapter One.

8.2 A preparation blank must be prepared and analyzed with each digestion batch, as discussed in Chapter One and detected Cr(VI) concentrations must be less than the method detection limit or one-tenth the regulatory limit or action level, whichever is greater or the entire batch must be redigested.

8.3 Laboratory Control Sample (LCS): As an additional determination of method performance, utilize the matrix spike solution prepared in Section 5.8.1 or the solid matrix spiking agent $PbCrO_4$ (Section 5.6) to spike into 50 mL of digestion solution (Section 5.7). Alternatively, the use of a certified solid reference material (if available) is recommended. Recovery must be within the certified acceptance range or a recovery range of 80% to 120% or the sample batch must be reanalyzed.

8.4 A separately prepared duplicate soil sample must be analyzed at a frequency of one per batch as discussed in Chapter One. Duplicate samples must have a Relative Percent Difference (RPD) of $\leq$ 20%, if both the original and the duplicate are $\geq$ four times the laboratory reporting limit. A control limit of ± the laboratory reporting limit is used when either the original or the duplicate sample is < four times the laboratory reporting limit.

8.5 Both soluble and insoluble pre-digestion matrix spikes must be analyzed at a frequency of one each per batch of $\leq$ 20 field samples. The soluble matrix spike sample is spiked with 1.0 mL of the spiking solution prepared in Section 5.8.1 (equivalent to 40 mg Cr(VI)/Kg)) or at twice the sample concentration, whichever is greater. The insoluble matrix spike is prepared by adding 10-20 mg of $PbCrO_4$ (Section 5.6) to a separate sample aliquot. It is used to evaluate the dissolution during the digestion process. Both matrix spikes are then carried through the digestion process described in Section 7.0. More frequent matrix spikes must be analyzed if the soil characteristics within the analytical batch appear to have significant variability based on visual observation. An acceptance range for matrix spike recoveries is 75-125%. If the matrix spike recoveries are not within these recovery limits, the entire batch must be rehomogenized/redigested/reanalyzed. If upon reanalysis, the matrix spike is not within the recovery limits, but the LCS is within criteria specified in Section 8.3, information such as that specified on Figures 1 and 2 and in Section 3.1 should be carefully evaluated . The Cr(VI) data may be valid for use despite the perceived "QC failure." The information shown on Figure 1 and discussed below is provided to interpret ancillary parameter data in conjunction with data on spike recoveries.

8.5.1 First measure the pH (Method 9045) and Oxidation Reduction Potential (ORP) (ASTM Method D 1498-93 - aqueous samples, Method 9045 preparatory for soil samples), in the field if possible. If not possible, the measurements are to be made in the laboratory prior to the determination of the spike recovery data. When and where the measurements are taken must be noted by the analyst. Adjust the ORP measurement based on reference electrode correction factor to yield Eh values. The pH and Eh values should be plotted on Figure 2 in order to give an initial indication of the sample's reducing/oxidizing nature. Upon completion of the analysis of the analytical batch, the LCS should be evaluated. If the LCS is not within 80 - 120% recovery or the certified acceptance range, then the entire analytical batch (plus the QC samples) should be redigested and reanalyzed. If the LCS was within acceptance criteria and the pre-digestion matrix spike recoveries for Cr(VI) were less than the acceptance range minimum (75%), this indicates that the soil samples reduced Cr(VI) (e.g., anoxic sediments), and no measurable native Cr(VI) existed in the unspiked sample (assuming the criteria in Section 8.3 are met). Such a result indicates that the combined and interacting influences of ORP, pH and reducing agents (e.g., organic acids, Fe^{2+} and sulfides) caused reduction of Cr(VI) spikes. Characterize each matrix spike sample for additional analytical parameters, such as ferrous iron (ASTM Method D3872-86), and sulfides (Method 9030). Laboratory measurements of pH and ORP should also be performed to confirm the field measurements. Other indirect indicators of reducing/oxidizing tendency include Total Organic Carbon (TOC), Chemical Oxygen Demand (COD), and Biological Oxygen Demand (BOD). Analysis of these additional parameters assists in evaluating the tendency of Cr(VI) to exist or not exist in the unspiked sample(s) and assists in the interpretation of QC data for matrix spike recoveries outside conventionally accepted criteria for total metals.

A value of Eh-pH below the bold diagonal line on Fig. 2 indicates a reducing soil for Cr(VI). The downward slope to the right indicates that the Eh value, at which Cr(VI) is expected to be reduced, decreases with increasing pH. The solubility and quantity of organic constituents influence reduction of Cr(VI). The presence of H_2S or other strong odors indicates a reducing environment for Cr(VI). In general, acidic conditions accelerate reduction of Cr(VI) in soils, and alkaline conditions tend to stabilize Cr(VI) against reduction. If pre-digestion matrix spike recovery is not within the recovery limits, the reductive nature of the sample must be documented. This is done by plotting the Eh and pH data on the Eh-pH diagram (Fig. 2) to see if spike recovery is or is not expected in the soil. If the data point falls below the Cr(VI)-Cr(III) line on the diagram, then the data is not qualified or rejected. The sample is reducing for Cr(VI). If the data point falls above the line, then the sample is capable of supporting Cr(VI). In this case, technical error may be responsible for the poor spike recovery, and the extraction should be repeated, along with the Eh and pH measurements. If re-extraction results in a poor spike recovery again, then the data is qualified. At this point, review of other soil characteristics, such as levels of pH, Eh, TOC, sulfides, Fe(II), is appropriate to understand why poor spike recovery occurred. This extra review of these soil properties is only necessary if the unspiked sample contains detectable Cr(VI).

8.5.2 If a low or zero percent pre-digestion matrix spike recovery is obtained, an alternate approach can be used to determine the potential contribution of the sample matrix to Cr(VI) reduction. This approach consists of performing a mass balance, whereby total chromium is analyzed (Method 3052) for two samples: (1) a separate unspiked aliquot of the sample previously used for spiking, and (2) the digested solids remaining after the alkaline digestion and filtration of the matrix spike (i.e., the filtered solids from the matrix spike in Section 7.6).

The difference between the total chromium measurements should be approximately equal to the amount of the spike added to the matrix spike. If the LCS (Section 8.3) met the acceptance criteria and the Cr(VI) spike is accounted for in the filtered solids as total chromium, it is likely that the reduction of the Cr(VI) to insoluble Cr(III) resulted from the reducing matrix of the original sample subjected to Cr(VI) spiking.

8.6 A post-digestion Cr(VI) matrix spike must be analyzed per batch as discussed in Chapter One. The post-digestion matrix spike concentration should be equivalent to 40 mg/kg or twice the sample concentration observed in the unspiked aliquot of the test sample, whichever is greater.

8.6.1 Dilute the sample aliquot to a minimum extent, if necessary, so that the absorbance reading for both the unspiked sample aliquot and spiked aliquot are within the initial calibration curve.

8.6.2 A guideline for the post-digestion matrix spike recovery is 85-115%. If not achieved, consider the corrective actions/guidance on data use specified in Section 8.5 or the Method of Standard Additions (MSA) as specified in Section 8.0 of Method 7000. If the MSA technique is applied post digestion and no spike is observed from the MSA, these results indicate that the matrix is incompatible with Cr(VI) and no further effort on the part of the laboratory is required. These digestates may contain soluble reducing agents for Cr(VI), such as fulvic acids.

9.0 METHOD PERFORMANCE

9.1 A commercial laboratory analyzed soil/sediment samples containing Cr(VI) with the results found in Table 1.

10.0 REFERENCES

10.1 United States Environmental Protection Agency, 1982. Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods. SW-846, Second Edition. Office of Solid Waste and Emergency Response, Washington, D.C.

10.2 New Jersey Department of Environmental Protection and Energy (NJDEPE). NJDEPE Modified Methods 3060/7196. 1992.

10.3 Vitale, R., G. Mussoline, J. Petura, B. James, 1993. A Method Evaluation Study of an Alkaline Digestion (Modified Method 3060) Followed by Colorimetric Determination (Method 7196) for the Analysis for Hexavalent Chromium in Solid Matrices. Environmental Standards, Inc. Valley Forge, PA 19482.

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10.10 U.S. Environmental Protection Agency. 1993. IRIS: A continuously updated electronic database maintained by the U.S. Environmental Protection Agency. National Library of Medicine, Bethesda, MD.

10.11 ASTM (American Society for Testing and Materials), 1981. Standard Test Method for Ferrous Iron in Iron Oxides. ASTM Designation:D3872-86.

10.12 ASTM (American Society for Testing and Materials), 1981. Standard Test Method for 24-h Batch-Type Measurement of Contaminant Sorption by Soil and Sediments. ASTM Designation:D4646-87.

10.13 ASTM (American Society for Testing and Materials), 1981. Standard Test Method for Single Batch Extraction Method for Waters. ASTM Designation:D5233-92.

10.14 ASTM (American Society for Testing and Materials), 1981. Standard Test Method for Shake Extraction of Solid Waste with Water. ASTM Designation:D3987-85.

10.15 U.S. EPA Contract Laboratory Program, Statement of Work for Organic Analysis, Multimedia Multiconcentration Document, OLM03.1, 8/94 Rev.

TABLE 1

SINGLE LABORATORY METHOD EVALUATION DATA

Sample Type	Eh (mV)[b]	pH[d]	S^{2-} (ppm)[c]	Mean Native Cr(VI) Conc. (mg/kg)	Mean Cr(VI) Spike Conc. (mg/kg)	Matrix Spike Recovery Range,%
COPR[a]/Soil Blends	550	7.4	<10.0	4.1	42.0	89.8-116
Loam	620	6.4	<10.0	ND	62.5	65.0-70.3
Clay	840	3.0	<10.0	ND	63.1	37.8-71.1
COPR[a]	460	7.4	<10.0	759	813	85.5-94.8
Anoxic Sediment	-189	7.2	25.0	ND	381	0
Quartz Sand	710	5.3	<10.0	ND	9.8	75.5-86.3

Source: Reference 10.3

Notes:

ND - Not detected

a - COPR - chromite ore processing residue

b - Corrected for the reference electrode, laboratory field moist measurement

c - Field measurement

d - Laboratory field moist measurement

FIGURE 1
QUALITY CONTROL FLOW CHART

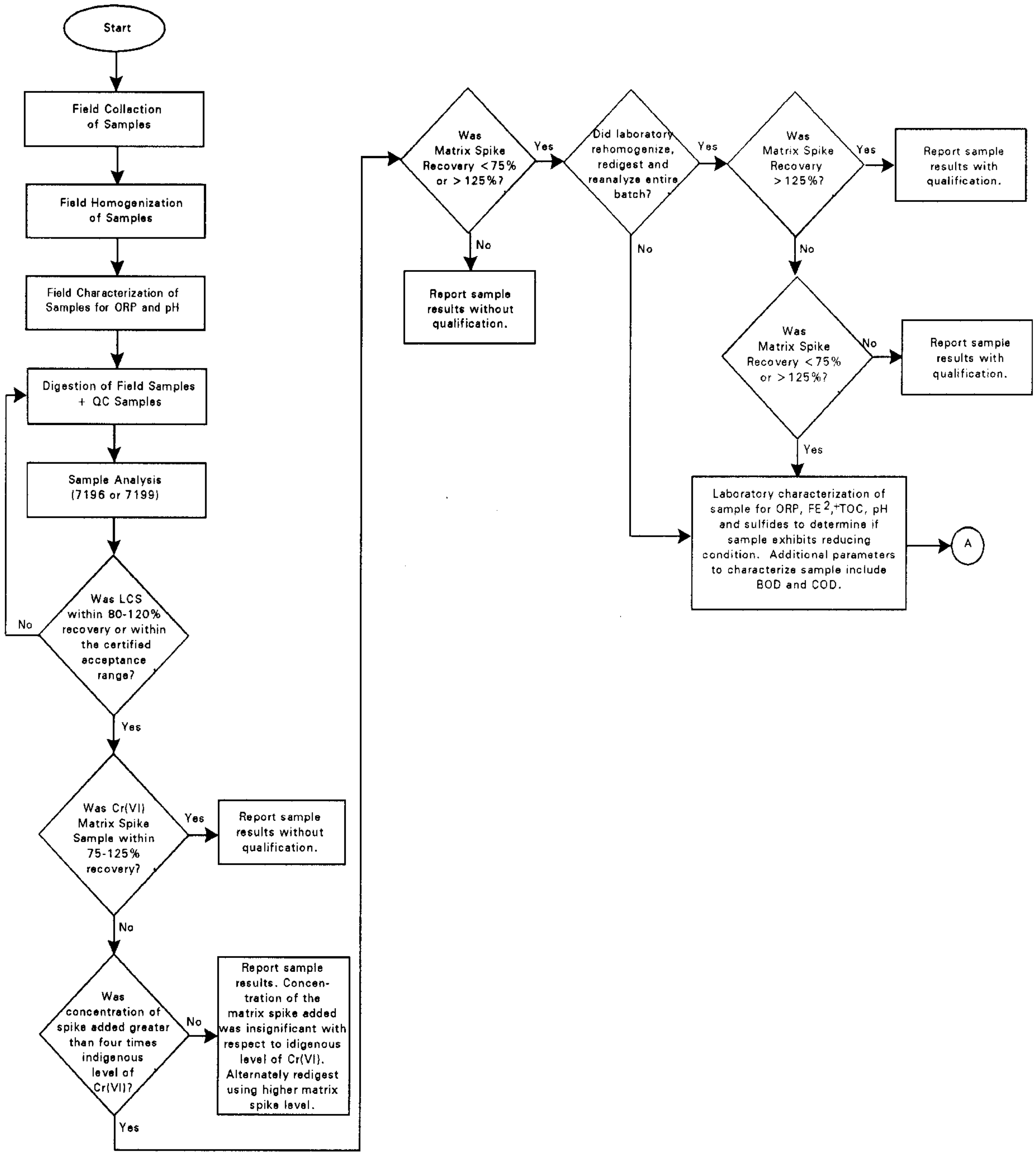


FIGURE 1
QUALITY CONTROL FLOW CHART (Continued)

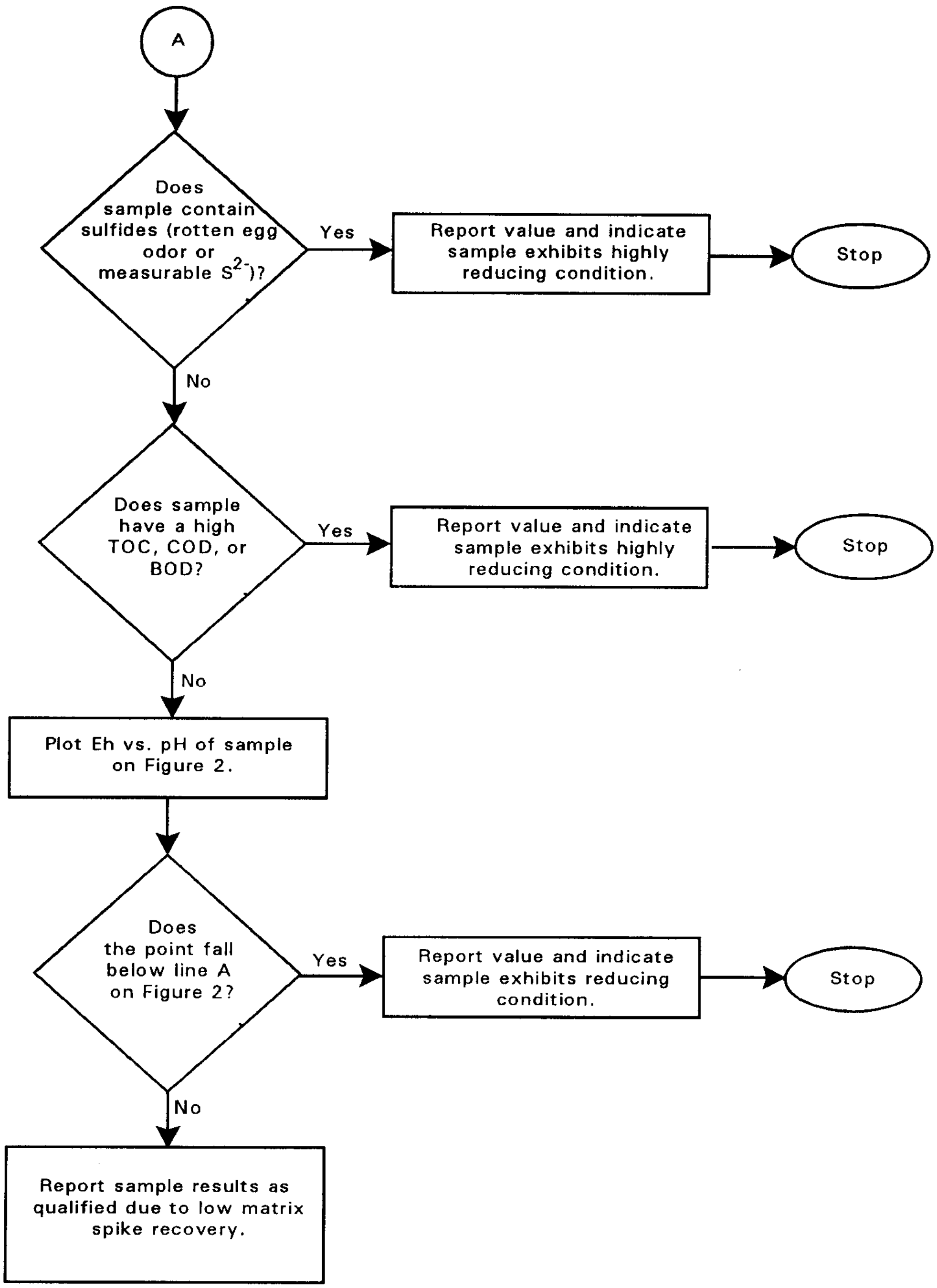
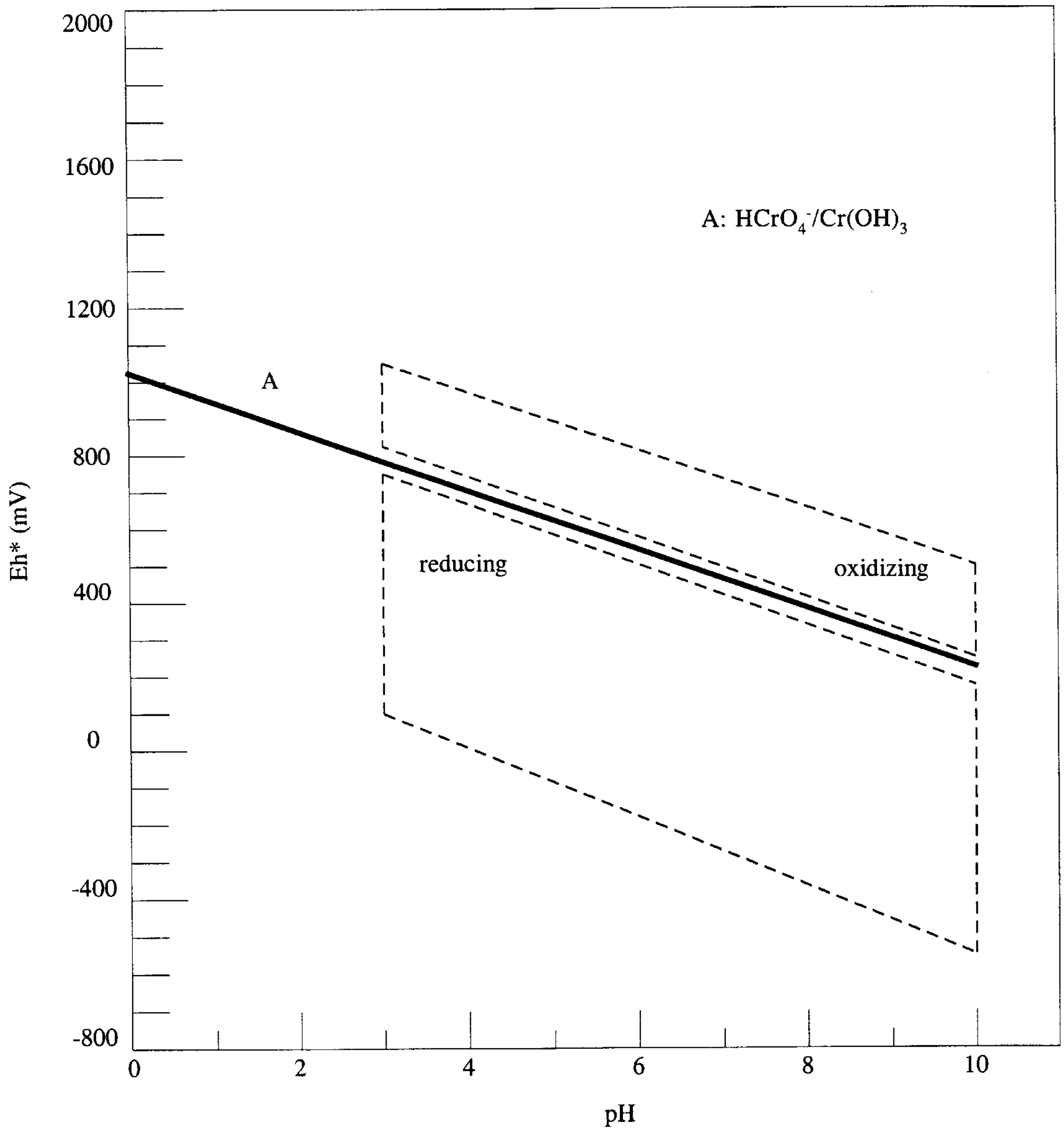


FIGURE 2
Eh/pH PHASE DIAGRAM

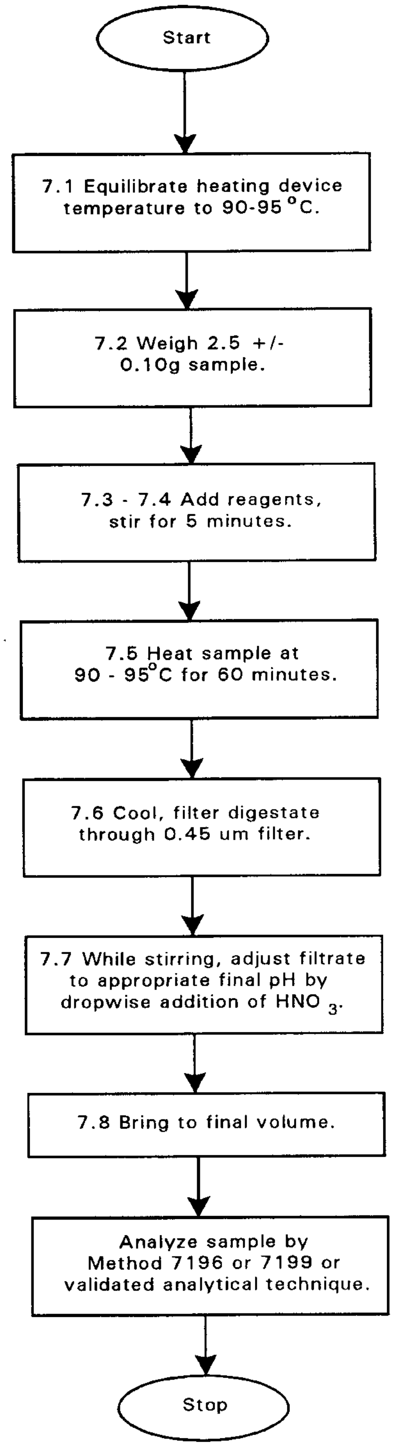
The dashed lines define Eh-pH boundaries commonly encountered in soils and sediments.



* Note the Eh values plotted on this diagram are corrected for the reference electrode voltage: 244 mV units must be added to the measured value when a separate calomel electrode is used, or 199 mV units must be added if a combination platinum electrode is used.

METHOD 3060A

ALKALINE DIGESTION FOR HEXAVALENT CHROMIUM



CATALOG#	Replaced By	DIRECTORY	SUB DATE	DATE RECEIVED	APP/REJ	DESCRIPTION	CONSULTANT
HB164585		040714SB	2/23/2015	2/23/2015	R	Hess Port Reading ISRA SI	EnviroTrac
HB164586		040914SB	2/23/2015	2/23/2015	A	Hess Port Reading ISRA SI	EnviroTrac
HB164653		040714SB	2/23/2015	2/24/2015	A	Hess Port Reading ISRA SI	EnviroTrac
HB164657		061813SB	2/24/2015	2/24/2015	A	Port Reading ISRA SI	EnviroTrac
HB164658		13-05864	2/24/2015	2/24/2015	A	Port Reading ISRA SI	EnviroTrac Ltd.
HB164659		13-05873	2/24/2015	2/24/2015	A	Port Reading ISRA SI	EnviroTrac Ltd.
HB165151		012115MW	3/6/2015	3/9/2015	A	Hess Port Reading AOC 3- #1 Landfarm	EnviroTrac
HB165152		012015MW	3/6/2015	3/9/2015	A	Hess Port Reading AOC 1- North Landfarm	EnviroTrac
HB165153		012115MW	3/6/2015	3/9/2015	A	Hess Port Reading AOC 2- South Landfarm	EnviroTrac
HB165154		13-06057	3/6/2015	3/9/2015	A	Port Reading EBP Soil Samples	EnviroTrac Ltd.
HB165155		13-05609	3/6/2015	3/9/2015	A	Port Reading EBP Soil Samples	EnviroTrac Ltd.
HB165156		13-06093	3/6/2015	3/9/2015	A	Port Reading EBP Soil Samples	EnviroTrac Ltd.
HB165157		012015MW	3/9/2015	3/9/2015	A	Hess Port Reading AOC 1- North Landfarm	EnviroTrac
HB165158		13-06143	3/9/2015	3/9/2015	A	Port Reading EBP Soil Samples	EnviroTrac Ltd.
HB165734		110113SB	3/24/2015	3/25/2015	A	Hess Port Reading Refinery	EnviroTrac
HB165815		022315SB	3/27/2015	3/27/2015	A	Hess Port Reading Refinery	EnviroTrac
HZ024760		a:1001g	12/20/2001	1/24/2011	A	Port Reading Refinery GWRAPR	IT Corporation
HZ024761	HB127186	a:1001y	12/20/2001	1/7/2002	S	Port Reading Refinery GWRAPR	IT Corporation
HZ024762		a:1001m	12/20/2001	1/24/2011	A	Port Reading Refinery GW RAPR	IT Corporation
HZ024763		a:1001s	12/20/2001	1/24/2011	A	Port Reading Refinery GWRAPR	IT Corporation
HZ024764	HB127187	a:1001l	12/20/2001	1/7/2002	S	Port Reading Refinery GWRAPR	IT Corporation
HZ032432		a:0702g	10/1/2002	1/24/2011	A	Port Reading Refinery GWRAPR	Shaw Environmental, Inc.

A - Approved S - Superseded

R - Rejected Replaced by in parentheses has not yet been confirmed.

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12/09/14

Technical Report for

EnviroTrac

Aeriation Basin (Pool), 750 Cliff Road, Port Reading, NJ

Aeriation Basins

Accutest Job Number: JB51845

Sampling Date: 11/01/13

Report to:

EnviroTrac

frankr@envirotrac.com

ATTN: Frank Rooney

Total number of pages in report: **119**

Test results contained within this data package meet the requirements of the National Environmental Laboratory Accreditation Program and/or state specific certification programs as applicable.

Nancy F. Cole
Nancy Cole
Laboratory Director

Client Service contact: Matt Cordova 732-329-0200

Certifications: NJ(12129), NY(10983), CA, CT, DE, FL, IL, IN, KS, KY, LA, MA, MD, MI, MT, NC, OH VAP (CL0056), AZ (AZ0786), PA, RI, SC, TN, VA, WV, DoD ELAP (L-A-B L2248)

Sections:

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Sample Summary

EnviroTrac

Job No: JB51845

Aeriation Basin (Pool), 750 Cliff Road, Port Reading, NJ
Project No: Aeriation Basins

Sample Number	Collected Date	Time	By	Received	Matrix Code	Type	Client Sample ID
JB51845-1	11/01/13	09:15	SD	11/01/13	SO	Soil	SW-2
JB51845-2	11/01/13	09:25	SD	11/01/13	SO	Soil	NW-2

Soil samples reported on a dry weight basis unless otherwise indicated on result page.

CASE NARRATIVE / CONFORMANCE SUMMARY

Client:	EnviroTrac	**Job No**	JB51845
Site:	Aeriation Basin (Pool), 750 Cliff Road, Port Reading, NJ	**Report Date**	11/10/2013 9:24:07 A

On 11/01/2013, 2 Sample(s), 0 Trip Blank(s) and 0 Field Blank(s) were received at Accutest Laboratories at a temperature of 4.8 C. Samples were intact and chemically preserved, unless noted below. An Accutest Job Number of JB51845 was assigned to the project. Laboratory sample ID, client sample ID and dates of sample collection are detailed in the report's Results Summary Section.

Specified quality control criteria were achieved for this job except as noted below. For more information, please refer to the analytical results and QC summary pages.

Extractables by GC By Method NJDEP EPH

Matrix: SO **Batch ID:** OP70366

- All samples were extracted within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JB51852-1MS, JB51852-1MSD, JB51845-1DUP were used as the QC samples indicated.
- Matrix Spike Recovery(s) for C16-C21 Aliphatics, C21-C40 Aliphatics, Total Aliphatics are outside the QC limits.
- Matrix Spike Duplicate Recovery(s) for C16-C21 Aliphatics, C21-C36 Aromatics, C21-C40 Aliphatics, Total Aliphatics are outside the QC limits.
- RPD(s) for Duplicate for C12-C16 Aliphatics, C12-C16 Aromatics, C16-C21 Aliphatics, C16-C21 Aromatics, C21-C36 Aromatics, C21-C40 Aliphatics, C9-C12 Aliphatics, Total Aliphatics, Total Aromatics, Total EPH are outside the QC limits

Metals By Method SW846 6010C

Matrix: SO **Batch ID:** M:MP21988

- The data for SW846 6010C meets quality control requirements.
- JB51845-2 for Chromium: Analysis performed at Accutest Laboratories, Marlborough, MA.
- JB51845-1 for Chromium: Analysis performed at Accutest Laboratories, Marlborough, MA.

Wet Chemistry By Method SM2540 G-97

Matrix: SO **Batch ID:** GN94327

- The data for SM2540 G-97 meets quality control requirements.

Accutest certifies that data reported for samples received, listed on the associated custody chain or analytical task order, were produced to specifications meeting Accutest's Quality System precision, accuracy and completeness objectives except as noted.

Estimated non-standard method measurement uncertainty data is available on request, based on quality control bias and implicit for standard methods. Acceptable uncertainty requires tested parameter quality control data to meet method criteria.

Accutest Laboratories is not responsible for data quality assumptions if partial reports are used and recommends that this report be used in its entirety. Data release is authorized by Accutest Laboratories indicated via signature on the report cover

ACCUTEST LABORATORIES

SAMPLE DELIVERY GROUP CASE NARRATIVE

Client: Accutest New Jersey **Job No** JB51845

Site: ENVNJB: Pool, 750 Cliff Road, Port Reading, NJ **Report Date** 11/8/2013 12:40:19 PM

2 Sample(s), 0 Trip Blank(s) and 0 Field Blank(s) were collected on 11/01/2013 and were received at Accutest on 11/01/2013 properly preserved, at 1.9 Deg. C and intact. These Samples received an Accutest job number of JB51845. A listing of the Laboratory Sample ID, Client Sample ID and dates of collection are presented in the Results Summary Section of this report.

Except as noted below, all method specified calibrations and quality control performance criteria were met for this job. For more information, please refer to QC summary pages.

Metals By Method SW846 6010C

Matrix: SO **Batch ID:** MP21988

- All samples were digested and analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) MC25944-1MS, MC25944-1MSD, MC25944-1SDL were used as the QC samples for metals.

The Accutest Laboratories of New England certifies that all analysis were performed within method specification. It is further recommended that this report to be used in its entirety.The Accutest Laboratories of NE, Laboratory Director or assignee as verified by the signature on the cover page has authorized the release of this report(JB51845).

Summary of Hits

Job Number: JB51845
Account: EnviroTrac
Project: Aeriation Basin (Pool), 750 Cliff Road, Port Reading, NJ
Collected: 11/01/13

3

Lab Sample ID / Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
JB51845-1	**SW-2**					
C12-C16 Aromatics		140	6.6	0.28	mg/kg	NJDEP EPH
C16-C21 Aromatics		860	6.6	0.41	mg/kg	NJDEP EPH
C21-C36 Aromatics		571	6.6	0.66	mg/kg	NJDEP EPH
Total Aromatics		1570	6.6	0.20	mg/kg	NJDEP EPH
C9-C12 Aliphatics		88.1	6.6	0.18	mg/kg	NJDEP EPH
C12-C16 Aliphatics		807	6.6	0.28	mg/kg	NJDEP EPH
C16-C21 Aliphatics		1220	6.6	0.25	mg/kg	NJDEP EPH
C21-C40 Aliphatics		1230	6.6	0.73	mg/kg	NJDEP EPH
Total Aliphatics		3350	6.6	0.18	mg/kg	NJDEP EPH
Total EPH		4920	6.6	0.18	mg/kg	NJDEP EPH
Chromium [a]		161	0.94		mg/kg	SW846 6010C
JB51845-2	**NW-2**					
C16-C21 Aromatics		114	6.7	0.42	mg/kg	NJDEP EPH
C21-C36 Aromatics		228	6.7	0.67	mg/kg	NJDEP EPH
Total Aromatics		342	6.7	0.20	mg/kg	NJDEP EPH
C12-C16 Aliphatics		45.1	6.7	0.29	mg/kg	NJDEP EPH
C16-C21 Aliphatics		100	6.7	0.25	mg/kg	NJDEP EPH
C21-C40 Aliphatics		240	6.7	0.74	mg/kg	NJDEP EPH
Total Aliphatics		385	6.7	0.19	mg/kg	NJDEP EPH
Total EPH		727	6.7	0.19	mg/kg	NJDEP EPH
Chromium [a]		28.9	0.91		mg/kg	SW846 6010C

(a) Analysis performed at Accutest Laboratories, Marlborough, MA.

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Sample Results

Report of Analysis

Accutest LabLink@829170 20:47 09-Dec-2014

Report of Analysis

Page 1 of 1

Client Sample ID:	SW-2		
Lab Sample ID:	JB51845-1	**Date Sampled:**	11/01/13
Matrix:	SO - Soil	**Date Received:**	11/01/13
Method:	NJDEP EPH SW846 3546	**Percent Solids:**	74.4
Project:	Aeriation Basin (Pool), 750 Cliff Road, Port Reading, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	6Y11556.D	1	11/05/13	OPM	11/04/13	OP70366	G6Y468
Run #2							

	Initial Weight	Final Volume
Run #1	16.3 g	2.0 ml
Run #2		

NJDEP EPH List

CAS No.	Compound	Result	RL	MDL	Units	Q
	C10-C12 Aromatics	ND	6.6	0.20	mg/kg	
	C12-C16 Aromatics	140	6.6	0.28	mg/kg	
	C16-C21 Aromatics	860	6.6	0.41	mg/kg	
	C21-C36 Aromatics	571	6.6	0.66	mg/kg	
	Total Aromatics	1570	6.6	0.20	mg/kg	
	C9-C12 Aliphatics	88.1	6.6	0.18	mg/kg	
	C12-C16 Aliphatics	807	6.6	0.28	mg/kg	
	C16-C21 Aliphatics	1220	6.6	0.25	mg/kg	
	C21-C40 Aliphatics	1230	6.6	0.73	mg/kg	
	Total Aliphatics	3350	6.6	0.18	mg/kg	
	Total EPH	4920	6.6	0.18	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	94%		40-140%
321-60-8	2-Fluorobiphenyl	78%		40-140%
3386-33-2	1-Chlorooctadecane	85%		40-140%
580-13-2	2-Bromonaphthalene	76%		40-140%

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
RL = Reporting Limit B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SW-2			
Lab Sample ID:	JB51845-1		**Date Sampled:**	11/01/13
Matrix:	SO - Soil		**Date Received:**	11/01/13
			Percent Solids:	74.4
Project:	Aeriation Basin (Pool), 750 Cliff Road, Port Reading, NJ			

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Chromium [a]	161	0.94	mg/kg	1	11/06/13	11/07/13	AMA	SW846 6010C [1]	SW846 3050B [2]

(1) Instrument QC Batch: M:MA16354
(2) Prep QC Batch: M:MP21988

(a) Analysis performed at Accutest Laboratories, Marlborough, MA.

RL = Reporting Limit

Accutest LabLink@829170 20:47 09-Dec-2014

Report of Analysis

Client Sample ID:	NW-2		
Lab Sample ID:	JB51845-2	**Date Sampled:**	11/01/13
Matrix:	SO - Soil	**Date Received:**	11/01/13
Method:	NJDEP EPH SW846 3546	**Percent Solids:**	76.0
Project:	Aeriation Basin (Pool), 750 Cliff Road, Port Reading, NJ		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	6Y11583.D	1	11/06/13	OPM	11/04/13	OP70366	G6Y469
Run #2							

	Initial Weight	Final Volume
Run #1	15.6 g	2.0 ml
Run #2		

NJDEP EPH List

CAS No.	Compound	Result	RL	MDL	Units	Q
	C10-C12 Aromatics	ND	6.7	0.20	mg/kg	
	C12-C16 Aromatics	ND	6.7	0.29	mg/kg	
	C16-C21 Aromatics	114	6.7	0.42	mg/kg	
	C21-C36 Aromatics	228	6.7	0.67	mg/kg	
	Total Aromatics	342	6.7	0.20	mg/kg	
	C9-C12 Aliphatics	ND	6.7	0.19	mg/kg	
	C12-C16 Aliphatics	45.1	6.7	0.29	mg/kg	
	C16-C21 Aliphatics	100	6.7	0.25	mg/kg	
	C21-C40 Aliphatics	240	6.7	0.74	mg/kg	
	Total Aliphatics	385	6.7	0.19	mg/kg	
	Total EPH	727	6.7	0.19	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	79%		40-140%
321-60-8	2-Fluorobiphenyl	78%		40-140%
3386-33-2	1-Chlorooctadecane	75%		40-140%
580-13-2	2-Bromonaphthalene	60%		40-140%

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
RL = Reporting Limit B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	NW-2			
Lab Sample ID:	JB51845-2		**Date Sampled:**	11/01/13
Matrix:	SO - Soil		**Date Received:**	11/01/13
			Percent Solids:	76.0
Project:	Aeriation Basin (Pool), 750 Cliff Road, Port Reading, NJ			

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Chromium [a]	28.9	0.91	mg/kg	1	11/06/13	11/07/13	AMA	SW846 6010C [1]	SW846 3050B [2]

(1) Instrument QC Batch: M:MA16354
(2) Prep QC Batch: M:MP21988

(a) Analysis performed at Accutest Laboratories, Marlborough, MA.

RL = Reporting Limit

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Misc. Forms

Custody Documents and Other Forms

Includes the following where applicable:

- Chain of Custody
- Sample Tracking Chronicle
- Internal Chain of Custody

Accutest Laboratories Southeast
Chain of Custody

ACCUTEST LABORATORIES

4405 Vineland Road, Suite C-15 Orlando, Fl 32811
TEL. 407-425-6700 • FAX: 407-425-0707
www.accutest.com

SO

Accutest JOB # JB51845 PAGE 1 OF 1

Accutest Quote # | SKIFF#

Client / Reporting Information

Company Name: EnviroTrac, Ltd.
Address: 6 Terri Lane, Suite #350
City: Burlington State: NJ Zip: 08016
Project Contact: Dave Carlson E-mail: dave.c@envirotrac.com
Phone#: (609) 387-5553
Sampler(s) Name(s) (Printed): Sarah Dyson/Sheila Gardner

Project Information

Project Name: POOI
Street: 750 Cliff Road
City: Port Reading State: NJ
Project #: Aeriation Basins
Fax #:
Client Purchase Order #:

Analytical Information: EPH (Fractionated), Chromium, Hex Chrom*

Matrix Codes: DW - Drinking Water, GW - Ground Water, WW - Water, SW - Surface Water, SO - Soil, SL - Sludge, OI - Oil, LIQ - Other Liquid, AIR - Air, SOL - Other Solid, WP - Wipe

Accutest Sample #	Field ID / Point of Collection	DATE	TIME	SAMPLED BY	MATRIX	TOTAL # OF BOTTLES	OTHER	NONE	HCl	NaOH	HNO3	H2SO4	NAOH+ZNAC	DI WATER	MEOH	EPH (Fractionated)	Chromium	Hex Chrom*									LAB USE ONLY
1	SW-2	11/1/13	0915	SD	SO	1		X								X	X										
2	NW-2	11/1/13	0925	SD	SO	1		X								X	X										SUB
																											M23

TURNAROUND TIME (Business Days) — Approved By: / Rush Code

- [ ] 10 Days Standard
- [ ] 7 Day RUSH
- [ ] 5 Day RUSH
- [x] 3 Day EMERGENCY
- [ ] 2 Day EMERGENCY
- [ ] 1 Day EMERGENCY
- [ ] OTHER

Emergency or Rush T/A Data Available VIA Email or Lablink

Data Deliverable Information

- [ ] COMMERCIAL "A" (RESULTS ONLY)
- [ ] COMMERCIAL "B" (RESULTS PLUS QC)
- [ ] REDT1 (EPA LEVEL 3)
- [ ] FULT1 (EPA LEVEL 4)
- [ ] EDD'S

Comments / Remarks

*extract & hold pending chromium results

Sample Custody must be documented below each time samples change possession, including courier delivery.

Relinquished by Sampler:	Date Time:	Received By:	Relinquished by:	Date Time:	Received By:
1 [signature]	11/1/13 1230	2 [signature]	3		4
Relinquished by: 5	Date Time:	Received By: 6 [signature]	Relinquished by: 7	Date Time:	Received By: 8

Lab Use Only: Custody Seal in Place: Y N Temp Blank Provided: Y N Preserved where Applicable: Y N Total # of Coolers: 1 Cooler Temperature (s) Celsius: 4.8°C

3B

JB51845: Chain of Custody
Page 1 of 6

Accutest Laboratories Sample Receipt Summary

Accutest Job Number: JB51845 **Client:** **Project:**

Date / Time Received: 11/1/2013 **Delivery Method:** **Airbill #'s:**

Cooler Temps (Initial/Adjusted): #1: (4.8/4.8); 0

Cooler Security	Y	N		Y	N
1. Custody Seals Present:	☑	☐	3. COC Present:	☑	☐
2. Custody Seals Intact:	☑	☐	4. Smpl Dates/Time OK	☑	☐

Cooler Temperature	Y	N
1. Temp criteria achieved:	☑	☐
2. Cooler temp verification:		
3. Cooler media:	Ice (Bag)	
4. No. Coolers:	1	

Quality Control_Preservatio	Y	N	N/A
1. Trip Blank present / cooler:	☐	☑	☐
2. Trip Blank listed on COC:	☐	☑	☐
3. Samples preserved properly:	☑	☐	
4. VOCs headspace free:	☐	☐	☑

Sample Integrity - Documentation	Y	N
1. Sample labels present on bottles:	☑	☐
2. Container labeling complete:	☑	☐
3. Sample container label / COC agree:	☑	☐

Sample Integrity - Condition	Y	N
1. Sample recvd within HT:	☑	☐
2. All containers accounted for:	☑	☐
3. Condition of sample:	Intact	

Sample Integrity - Instructions	Y	N	N/A
1. Analysis requested is clear:	☑	☐	
2. Bottles received for unspecified tests	☐	☑	
3. Sufficient volume recvd for analysis:	☑	☐	
4. Compositing instructions clear:	☐	☐	☑
5. Filtering instructions clear:	☐	☐	☑

Comments

Accutest Laboratories 2235 US Highway 130 Dayton, New Jersey
V:732.329.0200 F: 732.329.3499 www/accutest.com

JB51845: Chain of Custody
Page 2 of 6

ACCUTEST LABORATORIES

Job Change Order: JB51845

Requested Date:	11/8/2013	**Received Date:**	11/1/2013
Account Name:	EnviroTrac	**Due Date:**	11/8/2013
Project Description:	Aeriation Basin (Pool), 750 Cliff Road, Port Reading	**Deliverable:**	REDT2
CSR:	michello	**TAT (Days):**	3

Sample #: JB51845-1

Dept:

Change:
Please relog for XXCRA

SW-2

Above Changes Per: Sarah Dyson **Date:** 11/8/2013

To Client: This Change Order is confirmation of the revisions, previously discussed with the Accutest Client Service Representative.

Page 1 of 1

ACCUTEST LABORATORIES

Job Change Order: JB51845

Requested Date:	11/12/2013	**Received Date:**	11/1/2013
Account Name:	EnviroTrac	**Due Date:**	11/8/2013
Project Description:	Aeriation Basin (Pool), 750 Cliff Road, Port Reading	**Deliverable:**	REDT2
CSR:	michello	**TAT (Days):**	14

Sample #: JB51845-1

Dept:

Change: Please relog for CEC and update to SUB. Sample will be sent to ALLA

SW-2

Sample #: JB51845-2

Dept:

Change: Please relog for CEC and update to SUB. Sample will be send to aLLA

NW-2

Above Changes Per: Sarah Dyson **Date:** 11/12/2013

To Client: This Change Order is confirmation of the revisions, previously discussed with the Accutest Client Service Representative.

ACCUTEST LABORATORIES

Job Change Order: JB51845R

Requested Date:	11/13/2013	**Received Date:**	11/1/2013
Account Name:	EnviroTrac	**Due Date:**	11/13/2013
Project Description:	Aeriation Basin (Pool), 750 Cliff Road, Port Reading	**Deliverable:**	REDT2
CSR:	kellyp	**TAT (Days):**	3

Sample #: JB51845R-1R

Dept:

Change:
Please relog for XXCRAR

SW-2

Above Changes Per: Sarah Dyson **Date:** 11/13/2013

To Client: This Change Order is confirmation of the revisions, previously discussed with the Accutest Client Service Representative.

Page 1 of 1

Job Change Order: JB51845RT

Requested Date:	11/18/2013	**Received Date:**	11/1/2013
Account Name:	EnviroTrac	**Due Date:**	11/18/2013
Project Description:	Aeriation Basin (Pool), 750 Cliff Road, Port Reading	**Deliverable:**	REDT2
CSR:	michello	**TAT (Days):**	3

Sample #: JB51845RT-1RT

Dept:

Change:
Please relog for FE2/7, SULFS and TOC

SW-2

Above Changes Per: Dave Carlson **Date:** 11/18/2013

To Client: This Change Order is confirmation of the revisions, previously discussed with the Accutest Client Service Representative.

Page 1 of 1

JB51845: Chain of Custody
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Internal Sample Tracking Chronicle

EnviroTrac

Job No: JB51845

Aeriation Basin (Pool), 750 Cliff Road, Port Reading, NJ
Project No: Aeriation Basins

Sample Number	Method	Analyzed	By	Prepped	By	Test Codes
JB51845-1 SW-2	Collected: 01-NOV-13 09:15 By: SD		Received: 01-NOV-13 By: MB			
JB51845-1	SM2540 G-97	02-NOV-13 14:00	AR			%SOL
JB51845-1	NJDEP EPH	05-NOV-13 20:27	OPM	04-NOV-13	NP	BNJEPH
JB51845-1	SW846 6010C	07-NOV-13 00:11	AMA	06-NOV-13	AMA	CR
JB51845-2 NW-2	Collected: 01-NOV-13 09:25 By: SD		Received: 01-NOV-13 By: MB			
JB51845-2	SM2540 G-97	02-NOV-13 14:00	AR			%SOL
JB51845-2	NJDEP EPH	06-NOV-13 20:45	OPM	04-NOV-13	NP	BNJEPH
JB51845-2	SW846 6010C	07-NOV-13 00:16	AMA	06-NOV-13	AMA	CR

Accutest Internal Chain of Custody

Job Number: JB51845
Account: ENVNJB EnviroTrac
Project: Aeriation Basin (Pool), 750 Cliff Road, Port Reading, NJ
Received: 11/01/13

Sample.Bottle Number	Transfer FROM	Transfer TO	Date/Time	Reason
JB51845-1.1	Secured Storage	Bernadette Vassilatos	11/02/13 11:05	Retrieve from Storage
JB51845-1.1	Bernadette Vassilatos	Secured Staging Area	11/02/13 11:06	Return to Storage
JB51845-1.1	Secured Staging Area	Arayna Ramkelawan	11/02/13 11:08	Retrieve from Storage
JB51845-1.1	Arayna Ramkelawan	Secured Storage	11/02/13 14:03	Return to Storage
JB51845-1.1	Secured Storage	Bernadette Vassilatos	11/04/13 07:51	Retrieve from Storage
JB51845-1.1	Bernadette Vassilatos	Secured Staging Area	11/04/13 07:51	Return to Storage
JB51845-1.1	Secured Staging Area	Nidhi Patel	11/04/13 08:10	Retrieve from Storage
JB51845-1.1	Nidhi Patel	Secured Storage	11/04/13 17:11	Return to Storage
JB51845-1.1	Secured Storage	Bernadette Vassilatos	11/11/13 07:32	Retrieve from Storage
JB51845-1.1	Bernadette Vassilatos	Secured Staging Area	11/11/13 07:32	Return to Storage
JB51845-1.1	Secured Staging Area	Chris Herrmann	11/11/13 08:16	Retrieve from Storage
JB51845-1.1	Chris Herrmann	Secured Storage	11/11/13 16:34	Return to Storage
JB51845-1.1	Secured Storage	Nilesh Patel	11/11/13 17:18	Retrieve from Storage
JB51845-1.1	Nilesh Patel	Secured Storage	11/11/13 21:17	Return to Storage
JB51845-1.1	Secured Storage	Alfredo Crespo	11/14/13 08:16	Retrieve from Storage
JB51845-1.1	Alfredo Crespo	Secured Staging Area	11/14/13 08:17	Return to Storage
JB51845-1.1	Secured Staging Area	Joyce Malchuck	11/14/13 08:30	Retrieve from Storage
JB51845-1.1	Joyce Malchuck	Secured Storage	11/14/13 12:41	Return to Storage
JB51845-1.1	Secured Storage	Vaidehi Amin	11/19/13 09:44	Retrieve from Storage
JB51845-1.1	Vaidehi Amin	Sarvadaman Tripathi	11/19/13 11:53	Custody Transfer
JB51845-1.1	Sarvadaman Tripathi	Christianna Faunce	11/19/13 15:45	Custody Transfer
JB51845-1.1	Christianna Faunce	Secured Storage	11/19/13 19:43	Return to Storage
JB51845-1.1	Darnell Brown		12/16/13 18:16	Disposed
JB51845-1.1.1	Nidhi Patel	Organics Prep	11/04/13 08:15	Extract from JB51845-1.1
JB51845-1.1.1	Organics Prep	Nidhi Patel	11/04/13 17:10	Extract from JB51845-1.1
JB51845-1.1.1	Nidhi Patel	Extract Storage	11/04/13 17:10	Return to Storage
JB51845-1.1.1	Extract Storage	Owen McKenna	11/05/13 14:13	Retrieve from Storage
JB51845-1.1.1	Owen McKenna	GC6Y	11/05/13 14:13	Load on Instrument
JB51845-1.1.1	GC6Y	Owen McKenna	11/06/13 11:10	Unload from Instrument
JB51845-1.1.1	Owen McKenna	Extract Freezer	11/06/13 11:10	Return to Storage
JB51845-1.1.1	Extract Freezer		12/16/13 09:00	Disposed
JB51845-1.1.2	Nidhi Patel	Amirah Hillman	11/04/13 11:05	Aliquot from JB51845-1.1
JB51845-1.1.2	Wei Zhou		11/05/13 07:54	Depleted
Aliquot depleted				
JB51845-1.1.3	Amirah Hillman	Metals Digestion	11/04/13 12:36	Digestate from JB51845-1.1.2
JB51845-1.1.3	Metals Digestion	Amirah Hillman	11/04/13 12:38	Digestate from JB51845-1.1.2
JB51845-1.1.3	Amirah Hillman	Metals Digestate Storage	11/04/13 12:38	Return to Storage
JB51845-1.1.3	Metals Digestate Storage		01/13/14 09:00	Disposed
JB51845-1.2	Secured Storage	Robert Lofrano	11/05/13 08:43	Retrieve from Storage
JB51845-1.2	Robert Lofrano		11/05/13 08:50	Subcontract

Accutest Internal Chain of Custody

Job Number: JB51845
Account: ENVNJB EnviroTrac
Project: Aeriation Basin (Pool), 750 Cliff Road, Port Reading, NJ
Received: 11/01/13

Sample.Bottle Number	Transfer FROM	Transfer TO	Date/Time	Reason
JB51845-1.3	Secured Storage	Robert Lofrano	11/12/13 10:20	Retrieve from Storage
JB51845-1.3	Robert Lofrano		11/12/13 14:04	Subcontract
JB51845-2.1	Secured Storage	Bernadette Vassilatos	11/02/13 11:05	Retrieve from Storage
JB51845-2.1	Bernadette Vassilatos	Secured Staging Area	11/02/13 11:06	Return to Storage
JB51845-2.1	Secured Staging Area	Arayna Ramkelawan	11/02/13 11:08	Retrieve from Storage
JB51845-2.1	Arayna Ramkelawan	Secured Storage	11/02/13 14:03	Return to Storage
JB51845-2.1	Secured Storage	Bernadette Vassilatos	11/04/13 07:51	Retrieve from Storage
JB51845-2.1	Bernadette Vassilatos	Secured Staging Area	11/04/13 07:51	Return to Storage
JB51845-2.1	Secured Staging Area	Nidhi Patel	11/04/13 08:10	Retrieve from Storage
JB51845-2.1	Nidhi Patel	Secured Storage	11/04/13 17:11	Return to Storage
JB51845-2.1	Tony Esposito		12/02/13 09:59	Disposed
JB51845-2.1.1	Nidhi Patel	Organics Prep	11/04/13 08:15	Extract from JB51845-2.1
JB51845-2.1.1	Organics Prep	Nidhi Patel	11/04/13 17:10	Extract from JB51845-2.1
JB51845-2.1.1	Nidhi Patel	Extract Storage	11/04/13 17:10	Return to Storage
JB51845-2.1.1	Extract Storage	Owen McKenna	11/05/13 14:13	Retrieve from Storage
JB51845-2.1.1	Owen McKenna	GC6Y	11/05/13 14:13	Load on Instrument
JB51845-2.1.1	GC6Y	Owen McKenna	11/06/13 11:10	Unload from Instrument
JB51845-2.1.1	Owen McKenna	Extract Freezer	11/06/13 11:10	Return to Storage
JB51845-2.1.1	Extract Freezer	Ashley Royal	11/06/13 17:18	Retrieve from Storage
JB51845-2.1.1	Ashley Royal	GC6Y	11/06/13 17:18	Load on Instrument
JB51845-2.1.1	GC6Y	Owen McKenna	11/13/13 16:31	Unload from Instrument
JB51845-2.1.1	Owen McKenna	Extract Freezer	11/13/13 16:32	Return to Storage
JB51845-2.1.1	Extract Freezer		12/16/13 09:00	Disposed
JB51845-2.1.2	Nidhi Patel	Amirah Hillman	11/04/13 11:05	Aliquot from JB51845-2.1
JB51845-2.1.2	Wei Zhou		11/05/13 07:54	Depleted
Aliquot depleted				
JB51845-2.1.3	Amirah Hillman	Metals Digestion	11/04/13 12:36	Digestate from JB51845-2.1.2
JB51845-2.1.3	Metals Digestion	Amirah Hillman	11/04/13 12:38	Digestate from JB51845-2.1.2
JB51845-2.1.3	Amirah Hillman	Metals Digestate Storage	11/04/13 12:38	Return to Storage
JB51845-2.1.3	Metals Digestate Storage		01/13/14 09:00	Disposed
JB51845-2.2	Secured Storage	Robert Lofrano	11/05/13 08:43	Retrieve from Storage
JB51845-2.2	Robert Lofrano		11/05/13 08:50	Subcontract
JB51845-2.3	Secured Storage	Robert Lofrano	11/12/13 10:20	Retrieve from Storage
JB51845-2.3	Robert Lofrano		11/12/13 14:04	Subcontract

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GC Semi-volatiles

6

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries
- Surrogate Recovery Summaries
- GC Surrogate Retention Time Summaries
- Initial and Continuing Calibration Summaries

Method Blank Summary

Job Number: JB51845
Account: ENVNJB EnviroTrac
Project: Aeriation Basin (Pool), 750 Cliff Road, Port Reading, NJ

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP70366-MB1	6Y11545.D	1	11/05/13	OPM	11/04/13	OP70366	G6Y468

The QC reported here applies to the following samples: **Method:** NJDEP EPH

JB51845-1, JB51845-2

CAS No.	Compound	Result	RL	MDL	Units	Q
	C10-C12 Aromatics	ND	5.3	0.16	mg/kg	
	C12-C16 Aromatics	ND	5.3	0.23	mg/kg	
	C16-C21 Aromatics	ND	5.3	0.33	mg/kg	
	C21-C36 Aromatics	ND	5.3	0.53	mg/kg	
	Total Aromatics	ND	5.3	0.16	mg/kg	
	C9-C12 Aliphatics	ND	5.3	0.15	mg/kg	
	C12-C16 Aliphatics	ND	5.3	0.23	mg/kg	
	C16-C21 Aliphatics	ND	5.3	0.20	mg/kg	
	C21-C40 Aliphatics	ND	5.3	0.59	mg/kg	
	Total Aliphatics	ND	5.3	0.15	mg/kg	
	Total EPH	ND	5.3	0.15	mg/kg	

CAS No.	Surrogate Recoveries		Limits
84-15-1	o-Terphenyl	82%	40-140%
321-60-8	2-Fluorobiphenyl	79%	40-140%
3386-33-2	1-Chlorooctadecane	68%	40-140%
580-13-2	2-Bromonaphthalene	84%	40-140%

Blank Spike/Blank Spike Duplicate Summary

Job Number: JB51845
Account: ENVNJB EnviroTrac
Project: Aeriation Basin (Pool), 750 Cliff Road, Port Reading, NJ

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP70366-BS1	6Y11546.D	1	11/05/13	OPM	11/04/13	OP70366	G6Y468
OP70366-BSD	6Y11547.D	1	11/05/13	OPM	11/04/13	OP70366	G6Y468

The QC reported here applies to the following samples: **Method:** NJDEP EPH

JB51845-1, JB51845-2

CAS No.	Compound	Spike mg/kg	BSP mg/kg	BSP %	BSD mg/kg	BSD %	RPD	Limits Rec/RPD
	C10-C12 Aromatics	13.3	10.3	77	8.91	67	14	40-140/25
	C12-C16 Aromatics	20	19.0	95	16.8	84	12	40-140/25
	C16-C21 Aromatics	33.3	35.5	107	35.6	107	0	40-140/25
	C21-C36 Aromatics	53.3	51.8	97	71.8	135	32* [a]	40-140/25
	Total Aromatics	120	117	98	133	111	13	40-140/25
	C9-C12 Aliphatics	20	9.82	49	10.5	53	7	40-140/25
	C12-C16 Aliphatics	13.3	10.5	79	11.3	85	7	40-140/25
	C16-C21 Aliphatics	20	17.1	86	18.3	92	7	40-140/25
	C21-C40 Aliphatics	66.7	60.0	90	63.6	95	6	40-140/25
	Total Aliphatics	120	97.4	81	104	87	7	40-140/25
	Total EPH	240	214	89	237	99	10	40-140/25

CAS No.	Surrogate Recoveries	BSP	BSD	Limits
84-15-1	o-Terphenyl	92%	90%	40-140%
321-60-8	2-Fluorobiphenyl	94%	82%	40-140%
3386-33-2	1-Chlorooctadecane	66%	72%	40-140%
580-13-2	2-Bromonaphthalene	96%	89%	40-140%

Sample	Compound	Col #1	Col #2	Breakthrough	Limit
OP70366-BS1	2-Methylnaphthalene	5.69	ND	0.0%	5.0
OP70366-BS1	Naphthalene	5.26	ND	0.0%	5.0
OP70366-BSD	2-Methylnaphthalene	4.93	ND	0.0%	5.0
OP70366-BSD	Naphthalene	4.42	ND	0.0%	5.0

(a) Outside the QC limits.

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: JB51845
Account: ENVNJB EnviroTrac
Project: Aeriation Basin (Pool), 750 Cliff Road, Port Reading, NJ

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP70366-MS	6Y11563.D	1	11/06/13	OPM	11/04/13	OP70366	G6Y468
OP70366-MSD	6Y11564.D	1	11/06/13	OPM	11/04/13	OP70366	G6Y468
JB51852-1	6Y11548.D	1	11/05/13	OPM	11/04/13	OP70366	G6Y468

The QC reported here applies to the following samples: **Method:** NJDEP EPH

JB51845-1, JB51845-2

CAS No.	Compound	JB51852-1 mg/kg	Q	Spike mg/kg	MS mg/kg	MS %	Spike mg/kg	MSD mg/kg	MSD %	RPD	Limits Rec/RPD
	C10-C12 Aromatics	ND		13.9	13.7	99	13.7	13.3	97	3	40-140/50
	C12-C16 Aromatics	ND		20.8	25.9	125	20.5	21.6	105	18	40-140/50
	C16-C21 Aromatics	ND		34.6	48.5	140	34.2	44.4	130	9	40-140/50
	C21-C36 Aromatics	ND		55.4	72.5	131	54.7	78.8	144* [a]	8	40-140/50
	Total Aromatics	ND		125	161	129	123	158	128	2	40-140/50
	C9-C12 Aliphatics	ND		20.8	11.6	56	20.5	11.0	54	5	40-140/50
	C12-C16 Aliphatics	ND		13.9	13.3	96	13.7	11.4	83	15	40-140/50
	C16-C21 Aliphatics	30.9		20.8	30.5	0* [a]	20.5	27.5	0* [a]	10	40-140/50
	C21-C40 Aliphatics	59.4		69.3	63.2	5* [a]	68.4	84.7	37* [a]	29	40-140/50
	Total Aliphatics	90.3		125	119	23* [a]	123	135	36* [a]	13	40-140/50
	Total EPH	90.3		249	279	76	246	293	82	5	40-140/50

CAS No.	Surrogate Recoveries	MS	MSD	JB51852-1	Limits
84-15-1	o-Terphenyl	116%	98%	72%	40-140%
321-60-8	2-Fluorobiphenyl	114%	95%	85%	40-140%
3386-33-2	1-Chlorooctadecane	78%	68%	72%	40-140%
580-13-2	2-Bromonaphthalene	116%	102%	83%	40-140%

(a) Outside the QC limits.

* = Outside of Control Limits.

Duplicate Summary

Job Number: JB51845
Account: ENVNJB EnviroTrac
Project: Aeriation Basin (Pool), 750 Cliff Road, Port Reading, NJ

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP70366-DUP	6Y11562.D	1	11/05/13	OPM	11/04/13	OP70366	G6Y468
JB51845-1	6Y11556.D	1	11/05/13	OPM	11/04/13	OP70366	G6Y468

The QC reported here applies to the following samples: **Method:** NJDEP EPH

JB51845-1, JB51845-2

CAS No.	Compound	JB51845-1 mg/kg	Q	DUP mg/kg	Q	RPD	Limits
	C10-C12 Aromatics	ND		ND		nc	25
	C12-C16 Aromatics	140		250		56* [a]	25
	C16-C21 Aromatics	860		1470		52* [a]	25
	C21-C36 Aromatics	571		1040		58* [a]	25
	Total Aromatics	1570		2750		55* [a]	25
	C9-C12 Aliphatics	88.1		216		84* [a]	25
	C12-C16 Aliphatics	807		1640		68* [a]	25
	C16-C21 Aliphatics	1220		2310		62* [a]	25
	C21-C40 Aliphatics	1230		2230		58* [a]	25
	Total Aliphatics	3350		6390		62* [a]	25
	Total EPH	4920		9140		60* [a]	25

CAS No.	Surrogate Recoveries	DUP	JB51845-1	Limits
84-15-1	o-Terphenyl	95%	94%	40-140%
321-60-8	2-Fluorobiphenyl	84%	78%	40-140%
3386-33-2	1-Chlorooctadecane	96%	85%	40-140%
580-13-2	2-Bromonaphthalene	65%	76%	40-140%

(a) Outside the QC limits.

* = Outside of Control Limits.

Semivolatile Surrogate Recovery Summary

Job Number: JB51845
Account: ENVNJB EnviroTrac
Project: Aeriation Basin (Pool), 750 Cliff Road, Port Reading, NJ

Method: NJDEP EPH **Matrix:** SO

Samples and QC shown here apply to the above method

Lab Sample ID	Lab File ID	S1 [a]	S2 [a]	S3 [b]	S4 [a]
JB51845-1	6Y11556.D	94	78	85	76
JB51845-2	6Y11583.D	79	78	75	60
OP70366-BS1	6Y11546.D	92	94	66	96
OP70366-BSD	6Y11547.D	90	82	72	89
OP70366-DUP	6Y11562.D	95	84	96	65
OP70366-MB1	6Y11545.D	82	79	68	84
OP70366-MS	6Y11563.D	116	114	78	116
OP70366-MSD	6Y11564.D	98	95	68	102

Surrogate Compounds	Recovery Limits
S1 = o-Terphenyl	40-140%
S2 = 2-Fluorobiphenyl	40-140%
S3 = 1-Chlorooctadecane	40-140%
S4 = 2-Bromonaphthalene	40-140%

(a) Recovery from GC signal #1
(b) Recovery from GC signal #2

GC Surrogate Retention Time Summary

Job Number: JB51845
Account: ENVNJB EnviroTrac
Project: Aeriation Basin (Pool), 750 Cliff Road, Port Reading, NJ

Check Std: G6Y468-CC465
Lab File ID: 6Y11543.D
Instrument ID: GC6Y
Injection Date: 11/05/13
Injection Time: 13:39
Method: NJDEP EPH

	S1 [a] RT	S2 [a] RT	S3 [b] RT	S4 [a] RT
Check Std	8.78	5.76	10.97	6.48

Lab Sample ID	Lab File ID	Date Analyzed	Time Analyzed	S1 [a] RT	S2 [a] RT	S3 [b] RT	S4 [a] RT
OP70366-MB1	6Y11545.D	11/05/13	14:45	8.78	5.76	10.96	6.48
OP70366-BS1	6Y11546.D	11/05/13	15:16	8.78	5.76	10.96	6.48
OP70366-BSD	6Y11547.D	11/05/13	15:47	8.78	5.76	10.96	6.48
JB51852-1	6Y11548.D	11/05/13	16:18	8.78	5.76	10.96	6.48
ZZZZZZ	6Y11549.D	11/05/13	16:49	8.78	5.76	10.96	6.48
ZZZZZZ	6Y11550.D	11/05/13	17:20	8.78	5.77	10.96	6.48
ZZZZZZ	6Y11551.D	11/05/13	17:51	8.78	5.76	10.96	6.48
ZZZZZZ	6Y11552.D	11/05/13	18:22	8.78	5.76	10.96	6.48
ZZZZZZ	6Y11553.D	11/05/13	18:53	8.78	5.76	10.96	6.48

Surrogate Compounds

S1 = o-Terphenyl
S2 = 2-Fluorobiphenyl
S3 = 1-Chlorooctadecane
S4 = 2-Bromonaphthalene

(a) Retention time from GC signal #1
(b) Retention time from GC signal #2

GC Surrogate Retention Time Summary

Job Number: JB51845
Account: ENVNJB EnviroTrac
Project: Aeriation Basin (Pool), 750 Cliff Road, Port Reading, NJ

Check Std: G6Y468-CC465 **Injection Date:** 11/05/13
Lab File ID: 6Y11554.D **Injection Time:** 19:25
Instrument ID: GC6Y **Method:** NJDEP EPH

	S1 [a] RT	S2 [a] RT	S3 [b] RT	S4 [a] RT
Check Std	8.78	5.76	10.95	6.48

Lab Sample ID	Lab File ID	Date Analyzed	Time Analyzed	S1 [a] RT	S2 [a] RT	S3 [b] RT	S4 [a] RT
JB51845-1	6Y11556.D	11/05/13	20:27	8.78	5.77	10.99	6.48
ZZZZZZ	6Y11558.D	11/05/13	21:30	8.78	5.77	10.96	6.48
ZZZZZZ	6Y11559.D	11/05/13	22:02	8.78	5.77	10.96	6.48
ZZZZZZ	6Y11560.D	11/05/13	22:33	8.78	5.77	10.96	6.48
ZZZZZZ	6Y11561.D	11/05/13	23:04	8.78	5.77	10.96	6.48
OP70366-DUP	6Y11562.D	11/05/13	23:36	8.79	5.77	11.01	6.48
OP70366-MS	6Y11563.D	11/06/13	00:07	8.78	5.77	10.96	6.48
OP70366-MSD	6Y11564.D	11/06/13	00:39	8.78	5.76	10.96	6.48

Surrogate Compounds

S1 = o-Terphenyl
S2 = 2-Fluorobiphenyl
S3 = 1-Chlorooctadecane
S4 = 2-Bromonaphthalene

(a) Retention time from GC signal #1
(b) Retention time from GC signal #2

GC Surrogate Retention Time Summary

Job Number: JB51845
Account: ENVNJB EnviroTrac
Project: Aeriation Basin (Pool), 750 Cliff Road, Port Reading, NJ

Check Std:	G6Y469-CC465	**Injection Date:**	11/06/13
Lab File ID:	6Y11575.D	**Injection Time:**	15:25
Instrument ID:	GC6Y	**Method:**	NJDEP EPH

	S1 [a] RT	S2 [a] RT	S3 [b] RT	S4 [a] RT
Check Std	8.78	5.76	10.95	6.48

Lab Sample ID	Lab File ID	Date Analyzed	Time Analyzed	S1 [a] RT	S2 [a] RT	S3 [b] RT	S4 [a] RT
OP70000A-MB1	6Y11577.D	11/06/13	17:37	8.78	5.76	10.95	6.48
OP70000A-BS1	6Y11578.D	11/06/13	18:08	8.78	5.76	10.95	6.48
OP70000A-BSD	6Y11579.D	11/06/13	18:39	8.78	5.76	10.95	6.48
ZZZZZZ	6Y11580.D	11/06/13	19:10	8.78	5.76	10.95	6.48
ZZZZZZ	6Y11581.D	11/06/13	19:42	8.78	5.76	10.95	6.48
ZZZZZZ	6Y11582.D	11/06/13	20:13	8.78	5.76	10.95	6.48
JB51845-2	6Y11583.D	11/06/13	20:45	8.78	5.76	10.96	6.48
OP70423-MS	6Y11590.D	11/07/13	00:26	8.78	5.76	10.96	6.48
OP70423-MSD	6Y11591.D	11/07/13	00:57	8.78	5.76	10.96	6.48

Surrogate Compounds

S1 = o-Terphenyl
S2 = 2-Fluorobiphenyl
S3 = 1-Chlorooctadecane
S4 = 2-Bromonaphthalene

(a) Retention time from GC signal #1
(b) Retention time from GC signal #2

Initial Calibration Summary

Job Number: JB51845 **Sample:** G6Y465-ICC465
Account: ENVNJB EnviroTrac **Lab FileID:** 6Y11503.D
Project: Aeriation Basin (Pool), 750 Cliff Road, Port Reading, NJ

Response Factor Report GC6Y6Z

```
Method       : C:\MSDCHEM\1\METHODS\EPH6Y465.M (ChemStation Integrator)
Title        : NJDEP Extractable Petroleum Hydrocarbons
Last Update  : Mon Nov 04 09:29:09 2013
Response via : Initial Calibration

Calibration Files
100 =6y11504.D   50  =6y11503.D   20  =6y11502.D   10  =6y11501.D
2   =6y11499.D   5   =6y11500.D       =
```

Compound	100	50	20	10	2	5	Avg	%RSD
1)T 1,2,3-Trimethylbe	3.248	3.153	3.766	2.770	3.010	2.979	3.154 E5	10.82
2)T Naphthalene	3.437	3.442	4.044	2.919	3.211	3.200	3.375 E5	11.25
3)H C10-C12 Aromatics	3.343	3.297	3.905	2.844	3.110	3.090	3.265 E5	11.03
4)T 2-Methylnaphthale	3.332	3.398	3.975	2.840	3.136	3.151	3.305 E5	11.53
5)T Acenaphthylene	3.353	3.485	4.101	2.908	3.227	3.304	3.396 E5	11.64
6)T Acenaphthene	3.442	3.594	4.197	3.002	3.592	3.462	3.548 E5	10.85
7)H C12-C16 Aromatics	3.376	3.492	4.091	2.917	3.318	3.306	3.417 E5	11.21
8)T Fluorene	3.398	3.580	4.181	2.973	3.441	3.444	3.503 E5	11.17
9)T Phenanthrene	3.382	3.608	4.175	2.925	3.319	3.435	3.474 E5	11.83
10)T Anthracene	3.385	3.603	4.168	2.928	3.324	3.450	3.476 E5	11.70
11)T Fluoranthene	3.393	3.662	4.253	2.981	3.443	3.535	3.544 E5	11.75
12)T Pyrene	3.400	3.669	4.240	2.979	3.425	3.537	3.542 E5	11.67
13)H C16-C21 Aromatics	3.392	3.624	4.203	2.957	3.391	3.480	3.508 E5	11.61
14)T Benzo(a)Anthracen	3.353	3.589	4.190	2.964	3.340	3.549	3.497 E5	11.58
15)T Chrysene	3.357	3.593	4.202	2.986	3.382	3.578	3.516 E5	11.40
16)T Benzo(b)Fluoranth	3.339	3.487	4.146	3.034	3.345	3.618	3.495 E5	10.69
17)T Benzo(k)Fluoranth	3.289	3.475	4.133	3.004	3.351	3.587	3.473 E5	10.91
18)T Benzo(a)Pyrene	3.070	3.195	3.816	2.805	3.101	3.339	3.221 E5	10.57
19)T Indeno(1,2,3-cd)P	3.199	3.242	3.882	2.949	3.143	3.419	3.306 E5	9.70
20)T Dibenzo(ah)Anthra	3.137	3.234	3.896	2.971	3.187	3.448	3.312 E5	9.81
21)T Benzo(ghi)Perylen	3.189	3.239	3.934	3.037	3.218	3.463	3.347 E5	9.52
22)H C21-C36 Aromatics	3.242	3.382	4.025	2.969	3.258	3.500	3.396 E5	10.47
23)S 2-Fluorobiphenyl	3.162	3.257	3.797	2.699	3.344	3.123	3.230 E5	11.02
24)S 2-Bromonaphthalen	2.152	2.249	2.637	1.979	3.013	2.416	2.408 E5	15.46
25)S o-Terphenyl (S)	3.507	3.776	4.377	3.074	3.553	3.611	3.650 E5	11.67

Signal #2

Compound	100	50	20	10	2	5	Avg	%RSD
27)T C9	0.765	1.004	1.010	0.870	0.873	0.957	0.913 E6	10.39
28)T C10	0.794	1.009	1.017	0.913	0.919	1.001	0.942 E6	9.14
29)T C12	0.793	1.025	1.030	0.926	0.940	1.014	0.954 E6	9.54
30)H C9-C12 Aliphatics	0.784	1.012	1.019	0.903	0.911	0.991	0.937 E6	9.63
31)T C14	0.794	1.050	1.058	0.955	0.979	1.050	0.981 E6	10.31
32)T C16	0.799	1.074	1.079	0.974	1.007	1.071	1.001 E6	10.76
33)H C12-C16 Aliphatic	0.796	1.062	1.068	0.965	0.993	1.060	0.991 E6	10.54
34)T C18	0.802	1.095	1.096	0.992	1.036	1.091	1.019 E6	11.19
35)T C20	0.803	1.112	1.112	1.008	1.050	1.110	1.032 E6	11.65
36)T C21	0.979	1.123	1.122	1.232	1.286	1.361	1.184 E6	11.56
37)H C16-C21 Aliphatic	0.861	1.110	1.110	1.077	1.124	1.187	1.078 E6	10.42
38)T C22	0.873	1.224	1.223	1.104	1.155	1.225	1.134 E6	12.06
39)T C24	0.799	1.132	1.129	1.023	1.069	1.129	1.047 E6	12.32
40)T C26	0.807	1.157	1.152	1.040	1.082	1.152	1.065 E6	12.65
41)T C28	0.810	1.162	1.156	1.042	1.088	1.156	1.069 E6	12.69
42)T C30	0.834	1.176	1.169	1.054	1.094	1.168	1.082 E6	12.14
43)T C32	0.876	1.158	1.150	1.039	1.091	1.152	1.078 E6	10.15
44)T C34	1.011	1.207	1.198	1.089	1.130	1.203	1.140 E6	6.94
45)T C36	1.053	1.130	1.119	1.033	1.074	1.145	1.092 E6	4.16

Initial Calibration Summary

Job Number: JB51845 **Sample:** G6Y465-ICC465
Account: ENVNJB EnviroTrac **Lab FileID:** 6Y11503.D
Project: Aeriation Basin (Pool), 750 Cliff Road, Port Reading, NJ

46)T	C38	1.079	1.061	1.047	0.988	1.022	1.089	1.048 E6	3.57
47)T	C40	1.117	1.034	1.016	0.973	0.999	1.068	1.034 E6	4.99
48)H	C21-C40 Aliphatic	0.926	1.144	1.136	1.039	1.080	1.149	1.079 E6	8.02
49)S	Naphthalene (S)	0.985	1.029	1.057	1.032	1.023	1.153	1.047 E6	5.45
50)S	2-Methylnaphthale	1.007	1.078	1.077	1.041	1.056	1.154	1.069 E6	4.60
51)S	1-Chlorooctadecan	0.910	0.969	0.967	1.079	1.132	1.192	1.042 E6	10.55

(#) = Out of Range

EPH6Y465.M Mon Nov 04 09:29:49 2013 RPT1

6.7.1

6

Initial Calibration Verification

Job Number: JB51845 **Sample:** G6Y465-ICV465
Account: ENVNJB EnviroTrac **Lab FileID:** 6Y11505.D
Project: Aeriation Basin (Pool), 750 Cliff Road, Port Reading, NJ

```
                    Evaluate Continuing Calibration Report

Signal #1 : C:\msdchem\1\DATA\6Y465\6y11505.D\FID1B.ch   Vial: 8
Signal #2 : C:\msdchem\1\DATA\6Y465\6y11505.D\FID2A.ch
Acq On    :  1 Nov 2013   5:46 pm                      Operator: owenm
Sample    : icv465-50                                  Inst    : GC6Y6Z
Misc      : OP70103,G6y465,16.4,,,2,1                  Multiplr: 1.00
IntFile Signal #1: autoint1.e   IntFile Signal #2: autoint2.e

Method       : C:\MSDCHEM\1\METHODS\EPH6Y465.M (ChemStation Integrator)
Title        : NJDEP Extractable Petroleum Hydrocarbons
Last Update  : Mon Nov 04 09:29:09 2013
Response via : Multiple Level Calibration

Min. RRF     :   0.500  Min. Rel. Area :  50%  Max. R.T. Dev  0.50min
Max. RRF Dev :  30%     Max. Rel. Area : 200%
```

		Compound	AvgRF	CCRF		%Dev	Area%	Dev(min)	RT Window
1	T	1,2,3-Trimethylbenzene	315.410	302.385	E3	4.1	96	0.00	3.31- 3.37
2	T	Naphthalene	337.537	318.202	E3	5.7	92	0.00	4.52- 4.58
3	H	C10-C12 Aromatics	326.473	310.294	E3	5.0	95	0.00	3.07- 4.85
4	T	2-Methylnaphthalene	330.533	309.939	E3	6.2	91	0.00	5.28- 5.34
5	T	Acenaphthylene	339.642	313.190	E3	7.8	90	0.00	6.30- 6.36
6	T	Acenaphthene	354.800	322.567	E3	9.1	90	0.00	6.52- 6.58
7	H	C12-C16 Aromatics	341.658	315.232	E3	7.7	92	0.00	4.85- 6.83
8	T	Fluorene	350.294	318.670	E3	9.0	89	0.00	7.10- 7.16
9	T	Phenanthrene	347.410	316.594	E3	8.9	88	0.00	8.20- 8.27
10	T	Anthracene	347.615	316.436	E3	9.0	88	0.00	8.26- 8.32
11	T	Fluoranthene	354.449	315.165	E3	11.1	86	0.00	9.75- 9.81
12	T	Pyrene	354.176	315.915	E3	10.8	86	0.00	10.06-10.12
13	H	C16-C21 Aromatics	350.789	316.556	E3	9.8	90	0.00	6.83-10.37
14	T	Benzo(a)Anthracene	349.749	305.043	E3	12.8	85	0.00	12.00-12.06
15	T	Chrysene	351.637	305.326	E3	13.2	85	0.00	12.07-12.13
16	T	Benzo(b)Fluoranthene	349.488	299.153	E3	14.4	86	0.00	13.82-13.88
17	T	Benzo(k)Fluoranthene	347.320	298.305	E3	14.1	86	-0.01	13.86-13.92
18	T	Benzo(a)Pyrene	322.097	275.406	E3	14.5	86	0.00	14.32-14.38
19	T	Indeno(1,2,3-cd)Pyrene	330.570	287.786	E3	12.9	89	0.00	15.98-16.04
20	T	Dibenzo(ah)Anthracene	331.212	285.753	E3	13.7	88	0.00	16.04-16.10
21	T	Benzo(ghi)Perylene	334.661	288.849	E3	13.7	89	-0.01	16.33-16.39
22	H	C21-C36 Aromatics	339.592	293.203	E3	13.7	86	0.00	10.36-17.72
*****		Signal #2 *****							
27	T	C9	913.237	902.250	E3	1.2	90	0.00	3.13- 3.19
28	T	C10	942.220	914.649	E3	2.9	91	0.00	3.88- 3.94
29	T	C12	954.328	941.665	E3	1.3	92	0.00	5.38- 5.44
30	H	C9-C12 Aliphatics	936.595	919.522	E3	1.8	93	0.00	2.86- 5.70
31	T	C14	980.884	956.350	E3	2.5	91	0.00	6.76- 6.82
32	T	C16	1000.783	972.003	E3	2.9	90	0.00	7.99- 8.05
33	H	C12-C16 Aliphatics	990.833	964.176	E3	2.7	93	0.00	5.69- 8.35
34	T	C18	1018.748	974.824	E3	4.3	89	0.00	9.15- 9.21
35	T	C20	1032.447	995.250	E3	3.6	89	0.00	10.36-10.42
36	T	C21	1183.807	1106.208	E3	6.6	98	-0.01	10.98-11.04
37	H	C16-C21 Aliphatics	1078.334	1025.428	E3	4.9	96	0.00	8.35-11.33
38	T	C22	1133.906	1021.412	E3	9.9	83	0.00	11.61-11.68
39	T	C24	1046.879	1041.014	E3	0.6	92	0.00	12.86-12.93
40	T	C26	1065.035	1046.358	E3	1.8	90	0.00	14.09-14.15
41	T	C28	1069.026	1057.291	E3	1.1	91	0.00	15.24-15.34
42	T	C30	1082.169	1085.365	E3	-0.3	92	0.00	16.36-16.43

Initial Calibration Verification

Job Number: JB51845 **Sample:** G6Y465-ICV465
Account: ENVNJB EnviroTrac **Lab FileID:** 6Y11505.D
Project: Aeriation Basin (Pool), 750 Cliff Road, Port Reading, NJ

43	T	C32	1077.554	1093.449	E3	-1.5	94	0.00	17.40-17.47
44	T	C34	1.140	1.077	E6	5.5	89	-0.02	18.53-18.60
45	T	C36	1.092	1.058	E6	3.1	94	-0.03	19.97-20.03
46	T	C38	1.048	0.965	E6	7.9	91	-0.05	21.90-22.00
47	T	C40	1.034	0.861	E6	16.7	83	0.00	24.62-24.72
48	H	C21-C40 Aliphatics	1078.845	1030.517	E3	4.8	98	0.00	11.32-24.90

(#) = Out of Range SPCC's out = 0 CCC's out = 0
6y11503.D EPH6Y465.M Mon Nov 04 09:31:32 2013 RPT1

Continuing Calibration Summary

Job Number: JB51845 **Sample:** G6Y468-CC465
Account: ENVNJB EnviroTrac **Lab FileID:** 6Y11543.D
Project: Aeriation Basin (Pool), 750 Cliff Road, Port Reading, NJ

```
                    Evaluate Continuing Calibration Report

  Signal #1 : C:\msdchem\1\DATA\6Y468\6y11543.D\FID1B.ch   Vial: 3
  Signal #2 : C:\msdchem\1\DATA\6Y468\6y11543.D\FID2A.ch
  Acq On    :  5 Nov 2013   1:39 pm                      Operator: owenm
  Sample    : cc465-50                                   Inst    : GC6Y6Z
  Misc      : OP70289,G6y468,16.2,,,2,1                  Multiplr: 1.00
  IntFile Signal #1: autoint1.e   IntFile Signal #2: autoint2.e

  Method       : C:\MSDCHEM\1\METHODS\EPH6Y465.M (ChemStation Integrator)
  Title        : NJDEP Extractable Petroleum Hydrocarbons
  Last Update  : Wed Nov 06 08:49:48 2013
  Response via : Multiple Level Calibration

  Min. RRF     :   0.500  Min. Rel. Area :  50%  Max. R.T. Dev  0.50min
  Max. RRF Dev :  30%     Max. Rel. Area : 200%
```

#	Type	Compound	AvgRF	CCRF	%Dev	Area%	Dev(min)	RT Window
1	T	1,2,3-Trimethylbenzene	315.410	333.979 E3	-5.9	106	0.00	3.31- 3.37
2	T	Naphthalene	337.537	363.894 E3	-7.8	106	0.00	4.51- 4.57
3	H	C10-C12 Aromatics	326.473	348.937 E3	-6.9	106	0.00	3.30- 4.60
4	T	2-Methylnaphthalene	330.533	359.414 E3	-8.7	106	0.00	5.27- 5.33
5	T	Acenaphthylene	339.642	367.519 E3	-8.2	105	0.00	6.30- 6.36
6	T	Acenaphthene	354.800	378.212 E3	-6.6	105	0.00	6.52- 6.58
7	H	C12-C16 Aromatics	341.658	368.382 E3	-7.8	105	0.00	4.60- 6.60
8	T	Fluorene	350.294	374.577 E3	-6.9	105	0.00	7.10- 7.16
9	T	Phenanthrene	347.410	371.924 E3	-7.1	103	0.00	8.20- 8.27
10	T	Anthracene	347.615	369.708 E3	-6.4	103	0.00	8.26- 8.32
11	T	Fluoranthene	354.449	360.359 E3	-1.7	98	0.00	9.75- 9.81
12	T	Pyrene	354.176	357.035 E3	-0.8	97	0.00	10.06-10.12
13	H	C16-C21 Aromatics	350.789	366.721 E3	-4.5	97	0.00	6.61-10.15
14	T	Benzo(a)Anthracene	349.749	331.541 E3	5.2	92	0.00	12.01-12.07
15	T	Chrysene	351.637	329.762 E3	6.2	92	0.00	12.07-12.13
16	T	Benzo(b)Fluoranthene	349.488	312.030 E3	10.7	89	0.00	13.82-13.88
17	T	Benzo(k)Fluoranthene	347.320	312.270 E3	10.1	90	0.01	13.86-13.92
18	T	Benzo(a)Pyrene	322.097	285.143 E3	11.5	89	0.00	14.32-14.38
19	T	Indeno(1,2,3-cd)Pyrene	330.570	288.228 E3	12.8	89	0.01	15.99-16.05
20	T	Dibenzo(ah)Anthracene	331.212	286.691 E3	13.4	89	0.01	16.04-16.10
21	T	Benzo(ghi)Perylene	334.661	288.533 E3	13.8	89	0.02	16.33-16.39
22	H	C21-C36 Aromatics	339.592	304.275 E3	10.4	89	0.00	10.15-17.50
23	S	2-Fluorobiphenyl (S)	323.031	344.917 E3	-6.8	106	0.00	5.73- 5.79
24	S	2-Bromonaphthalene (S)	240.765	235.934 E3	2.0	105	0.00	6.45- 6.51
25	S	o-Terphenyl (S)	364.960	387.751 E3	-6.2	103	0.00	8.75- 8.81

***** Signal #2 *****

#	Type	Compound	AvgRF	CCRF	%Dev	Area%	Dev(min)	RT Window
27	T	C9	913.237	1026.899 E3	-12.4	102	0.00	3.14- 3.20
28	T	C10	942.220	1041.573 E3	-10.5	103	0.00	3.89- 3.95
29	T	C12	954.328	1060.658 E3	-11.1	104	0.00	5.39- 5.45
30	H	C9-C12 Aliphatics	936.595	1043.043 E3	-11.4	103	0.00	3.05- 5.51
31	T	C14	980.884	1086.309 E3	-10.7	103	0.00	6.77- 6.83
32	T	C16	1000.783	1105.203 E3	-10.4	103	0.01	8.00- 8.06
33	H	C12-C16 Aliphatics	990.833	1095.756 E3	-11.4	103	0.00	5.50- 8.05
34	T	C18	1018.748	1117.232 E3	-9.7	102	0.02	9.16- 9.22
35	T	C20	1032.447	1128.373 E3	-9.3	101	0.02	10.37-10.43
36	T	C21	1183.807	1137.394 E3	3.9	101	0.02	10.99-11.05
37	H	C16-C21 Aliphatics	1078.334	1127.666 E3	-4.8	105	0.00	8.05-11.07
38	T	C22	1133.906	1235.431 E3	-9.0	101	0.02	11.62-11.69
39	T	C24	1046.879	1135.180 E3	-8.4	100	0.02	12.88-12.95

Continuing Calibration Summary

Job Number: JB51845 **Sample:** G6Y468-CC465
Account: ENVNJB EnviroTrac **Lab FileID:** 6Y11543.D
Project: Aeriation Basin (Pool), 750 Cliff Road, Port Reading, NJ

40	T	C26	1065.035	1155.306	E3	-8.5	100	0.02	14.10-14.16
41	T	C28	1069.026	1153.815	E3	-7.9	99	0.02	15.26-15.35
42	T	C30	1082.169	1161.849	E3	-7.4	99	0.03	16.38-16.45
43	T	C32	1077.554	1138.528	E3	-5.7	98	0.03	17.42-17.49
44	T	C34	1.140	1.178	E6	-3.3	98	0.04	18.55-18.62
45	T	C36	1.092	1.088	E6	0.4	96	0.05	20.00-20.06
46	T	C38	1.048	1.000	E6	4.6	94	0.07	21.94-22.04
47	T	C40	1.034	0.940	E6	9.1	91	0.08	24.65-24.75
48	H	C21-C40 Aliphatics	1078.845	1118.580	E3	-3.7	91	0.00	11.07-24.93
49	S	Naphthalene (S)	1046.623	1081.703	E3	-3.4	105	0.00	5.42- 5.48
50	S	2-Methylnaphthalene (S	1.069	1.115	E6	-4.3	103	0.00	6.22- 6.28
51	S	1-Chlorooctadecane (S)	1041.538	978.639	E3	6.0	101	0.02	10.94-11.00

(#) = Out of Range SPCC's out = 0 CCC's out = 0
6y11554.D EPH6Y465.M Wed Nov 06 09:11:12 2013 RPT1

Continuing Calibration Summary

Job Number: JB51845 **Sample:** G6Y468-CC465
Account: ENVNJB EnviroTrac **Lab FileID:** 6Y11554.D
Project: Aeriation Basin (Pool), 750 Cliff Road, Port Reading, NJ

Evaluate Continuing Calibration Report

```
Signal #1 : C:\msdchem\1\DATA\6Y468\6y11554.D\FID1B.ch    Vial: 2
Signal #2 : C:\msdchem\1\DATA\6Y468\6y11554.D\FID2A.ch
Acq On    :  5 Nov 2013   7:25 pm                      Operator: owenm
Sample    : cc465-20                                    Inst    : GC6Y6Z
Misc      : OP70366,G6y468,15.0,,,2,1                   Multiplr: 1.00
IntFile Signal #1: autoint1.e   IntFile Signal #2: autoint2.e

Method       : C:\MSDCHEM\1\METHODS\EPH6Y465.M (ChemStation Integrator)
Title        : NJDEP Extractable Petroleum Hydrocarbons
Last Update  : Wed Nov 06 08:49:48 2013
Response via : Multiple Level Calibration

Min. RRF     :   0.500  Min. Rel. Area :  50%  Max. R.T. Dev  0.50min
Max. RRF Dev :  30%     Max. Rel. Area : 200%
```

#		Compound	AvgRF	CCRF		%Dev	Area%	Dev(min)	RT Window
1	T	1,2,3-Trimethylbenzene	315.410	352.088	E3	-11.6	93	0.00	3.31- 3.37
2	T	Naphthalene	337.537	369.705	E3	-9.5	91	0.00	4.52- 4.58
3	H	C10-C12 Aromatics	326.473	360.897	E3	-10.5	92	0.00	3.30- 4.60
4	T	2-Methylnaphthalene	330.533	355.371	E3	-7.5	89	0.00	5.28- 5.34
5	T	Acenaphthylene	339.642	359.015	E3	-5.7	88	0.00	6.30- 6.36
6	T	Acenaphthene	354.800	369.285	E3	-4.1	88	0.00	6.52- 6.58
7	H	C12-C16 Aromatics	341.658	361.224	E3	-5.7	94	0.00	4.60- 6.60
8	T	Fluorene	350.294	356.908	E3	-1.9	85	0.00	7.10- 7.16
9	T	Phenanthrene	347.410	349.778	E3	-0.7	84	0.00	8.20- 8.27
10	T	Anthracene	347.615	348.746	E3	-0.3	84	0.00	8.26- 8.32
11	T	Fluoranthene	354.449	343.564	E3	3.1	81	0.00	9.74- 9.80
12	T	Pyrene	354.176	343.860	E3	2.9	81	0.00	10.06-10.12
13	H	C16-C21 Aromatics	350.789	348.571	E3	0.6	87	0.00	6.61-10.15
14	T	Benzo(a)Anthracene	349.749	331.676	E3	5.2	79	0.00	12.00-12.06
15	T	Chrysene	351.637	334.410	E3	4.9	80	0.00	12.07-12.13
16	T	Benzo(b)Fluoranthene	349.488	341.512	E3	2.3	82	0.00	13.81-13.87
17	T	Benzo(k)Fluoranthene	347.320	330.396	E3	4.9	80	0.00	13.85-13.91
18	T	Benzo(a)Pyrene	322.097	307.739	E3	4.5	81	0.00	14.31-14.37
19	T	Indeno(1,2,3-cd)Pyrene	330.570	323.343	E3	2.2	83	0.00	15.97-16.03
20	T	Dibenzo(ah)Anthracene	331.212	328.819	E3	0.7	84	0.00	16.03-16.09
21	T	Benzo(ghi)Perylene	334.661	328.345	E3	1.9	83	0.00	16.32-16.38
22	H	C21-C36 Aromatics	339.592	328.280	E3	3.3	83	0.00	10.15-17.50
23	S	2-Fluorobiphenyl (S)	323.031	334.237	E3	-3.5	88	0.00	5.73- 5.79
24	S	2-Bromonaphthalene (S)	240.765	222.816	E3	7.5	85	0.00	6.45- 6.51
25	S	o-Terphenyl (S)	364.960	363.972	E3	0.3	83	0.00	8.75- 8.81
*****		Signal #2 *****							
27	T	C9	913.237	1064.160	E3	-16.5	105	0.00	3.14- 3.20
28	T	C10	942.220	1082.943	E3	-14.9	106	0.00	3.88- 3.94
29	T	C12	954.328	1091.539	E3	-14.4	106	0.00	5.38- 5.44
30	H	C9-C12 Aliphatics	936.595	1079.547	E3	-15.3	106	0.00	3.05- 5.51
31	T	C14	980.884	1120.234	E3	-14.2	106	0.00	6.76- 6.82
32	T	C16	1000.783	1140.329	E3	-13.9	106	0.00	7.99- 8.05
33	H	C12-C16 Aliphatics	990.833	1130.281	E3	-14.1	106	0.00	5.50- 8.05
34	T	C18	1018.748	1155.273	E3	-13.4	105	0.00	9.14- 9.20
35	T	C20	1032.447	1169.173	E3	-13.2	105	0.00	10.35-10.41
36	T	C21	1183.807	1179.148	E3	0.4	105	0.00	10.97-11.03
37	H	C16-C21 Aliphatics	1078.334	1167.865	E3	-8.3	105	0.00	8.05-11.07
38	T	C22	1133.906	1281.151	E3	-13.0	105	0.00	11.60-11.67
39	T	C24	1046.879	1177.256	E3	-12.5	104	0.00	12.86-12.93

Continuing Calibration Summary

Job Number: JB51845 **Sample:** G6Y468-CC465
Account: ENVNJB EnviroTrac **Lab FileID:** 6Y11554.D
Project: Aeriation Basin (Pool), 750 Cliff Road, Port Reading, NJ

40	T	C26	1065.035	1286.068	E3	-20.8	112	0.00	14.08-14.14
41	T	C28	1069.026	1200.314	E3	-12.3	104	0.00	15.23-15.33
42	T	C30	1082.169	1209.086	E3	-11.7	103	0.00	16.35-16.42
43	T	C32	1077.554	1186.361	E3	-10.1	103	0.00	17.39-17.46
44	T	C34	1.140	1.230	E6	-7.9	103	0.00	18.51-18.58
45	T	C36	1.092	1.136	E6	-4.0	102	0.00	19.95-20.01
46	T	C38	1.048	1.043	E6	0.5	100	0.00	21.87-21.97
47	T	C40	1.034	0.986	E6	4.6	97	0.00	24.57-24.67
48	H	C21-C40 Aliphatics	1078.845	1173.552	E3	-8.8	100	0.00	11.07-24.93
49	S	Naphthalene (S)	1046.623	1121.740	E3	-7.2	106	0.00	5.42- 5.48
50	S	2-Methylnaphthalene (S	1.069	1.132	E6	-5.9	105	0.00	6.21- 6.27
51	S	1-Chlorooctadecane (S)	1041.538	1012.350	E3	2.8	105	0.00	10.92-10.98

(#) = Out of Range SPCC's out = 0 CCC's out = 0
6y11506.D EPH6Y465.M Wed Nov 06 09:09:57 2013 RPT1

6.7.4

6

Continuing Calibration Summary

Job Number: JB51845 **Sample:** G6Y468-CC465
Account: ENVNJB EnviroTrac **Lab FileID:** 6Y11565.D
Project: Aeriation Basin (Pool), 750 Cliff Road, Port Reading, NJ

```
                    Evaluate Continuing Calibration Report

  Signal #1 : C:\msdchem\1\DATA\6Y468\6y11565.D\FID1B.ch   Vial: 3
  Signal #2 : C:\msdchem\1\DATA\6Y468\6y11565.D\FID2A.ch
  Acq On    :  6 Nov 2013   1:10 am                      Operator: owenm
  Sample    : cc465-50                                   Inst    : GC6Y6Z
  Misc      : OP70366,G6y468,15.0,,,2,1                  Multiplr: 1.00
  IntFile Signal #1: autoint1.e   IntFile Signal #2: autoint2.e

  Method       : C:\MSDCHEM\1\METHODS\EPH6Y465.M (ChemStation Integrator)
  Title        : NJDEP Extractable Petroleum Hydrocarbons
  Last Update  : Wed Nov 06 08:49:48 2013
  Response via : Multiple Level Calibration

  Min. RRF     :   0.500  Min. Rel. Area :  50%  Max. R.T. Dev  0.50min
  Max. RRF Dev :  30%     Max. Rel. Area : 200%
```

#	Type	Compound	AvgRF	CCRF		%Dev	Area%	Dev(min)	RT Window
1	T	1,2,3-Trimethylbenzene	315.410	316.836	E3	-0.5	101	0.00	3.31- 3.37
2	T	Naphthalene	337.537	331.731	E3	1.7	96	0.00	4.52- 4.58
3	H	C10-C12 Aromatics	326.473	324.284	E3	0.7	98	0.00	3.30- 4.60
4	T	2-Methylnaphthalene	330.533	319.188	E3	3.4	94	0.00	5.28- 5.34
5	T	Acenaphthylene	339.642	317.549	E3	6.5	91	0.00	6.30- 6.36
6	T	Acenaphthene	354.800	326.311	E3	8.0	91	0.00	6.52- 6.58
7	H	C12-C16 Aromatics	341.658	321.016	E3	6.0	94	0.00	4.60- 6.60
8	T	Fluorene	350.294	315.832	E3	9.8	88	0.00	7.10- 7.16
9	T	Phenanthrene	347.410	308.855	E3	11.1	86	0.00	8.20- 8.27
10	T	Anthracene	347.615	307.748	E3	11.5	85	0.00	8.26- 8.32
11	T	Fluoranthene	354.449	307.018	E3	13.4	84	0.00	9.75- 9.81
12	T	Pyrene	354.176	307.846	E3	13.1	84	0.00	10.06-10.12
13	H	C16-C21 Aromatics	350.789	309.460	E3	11.8	84	0.00	6.61-10.15
14	T	Benzo(a)Anthracene	349.749	305.231	E3	12.7	85	0.00	12.00-12.06
15	T	Chrysene	351.637	309.237	E3	12.1	86	0.00	12.07-12.13
16	T	Benzo(b)Fluoranthene	349.488	304.450	E3	12.9	87	0.00	13.82-13.88
17	T	Benzo(k)Fluoranthene	347.320	303.696	E3	12.6	87	0.00	13.86-13.92
18	T	Benzo(a)Pyrene	322.097	282.040	E3	12.4	88	0.00	14.32-14.38
19	T	Indeno(1,2,3-cd)Pyrene	330.570	294.496	E3	10.9	91	0.00	15.98-16.04
20	T	Dibenzo(ah)Anthracene	331.212	293.649	E3	11.3	91	0.00	16.03-16.09
21	T	Benzo(ghi)Perylene	334.661	295.968	E3	11.6	91	0.00	16.32-16.38
22	H	C21-C36 Aromatics	339.592	298.596	E3	12.1	91	0.00	10.15-17.50
23	S	2-Fluorobiphenyl (S)	323.031	299.869	E3	7.2	92	0.00	5.73- 5.79
24	S	2-Bromonaphthalene (S)	240.765	200.352	E3	16.8	89	0.00	6.45- 6.51
25	S	o-Terphenyl (S)	364.960	317.617	E3	13.0	84	0.00	8.75- 8.81

***** Signal #2 *****

#	Type	Compound	AvgRF	CCRF		%Dev	Area%	Dev(min)	RT Window
27	T	C9	913.237	1058.796	E3	-15.9	105	0.00	3.14- 3.20
28	T	C10	942.220	1093.680	E3	-16.1	108	0.00	3.88- 3.94
29	T	C12	954.328	1097.480	E3	-15.0	107	0.00	5.39- 5.45
30	H	C9-C12 Aliphatics	936.595	1083.319	E3	-15.7	108	0.00	3.05- 5.51
31	T	C14	980.884	1121.301	E3	-14.3	107	0.00	6.76- 6.82
32	T	C16	1000.783	1141.866	E3	-14.1	106	0.00	7.99- 8.05
33	H	C12-C16 Aliphatics	990.833	1131.583	E3	-14.2	106	0.00	5.50- 8.05
34	T	C18	1018.748	1159.916	E3	-13.9	106	0.00	9.15- 9.21
35	T	C20	1032.447	1176.407	E3	-13.9	106	0.00	10.36-10.42
36	T	C21	1183.807	1186.224	E3	-0.2	106	0.00	10.98-11.04
37	H	C16-C21 Aliphatics	1078.334	1174.183	E3	-8.9	106	0.00	8.05-11.07
38	T	C22	1133.906	1293.936	E3	-14.1	106	0.00	11.61-11.68
39	T	C24	1046.879	1191.351	E3	-13.8	105	0.00	12.87-12.94

Continuing Calibration Summary

Job Number: JB51845 **Sample:** G6Y468-CC465
Account: ENVNJB EnviroTrac **Lab FileID:** 6Y11565.D
Project: Aeriation Basin (Pool), 750 Cliff Road, Port Reading, NJ

40	T	C26	1065.035	1221.204	E3	-14.7	106	0.01	14.09-14.15
41	T	C28	1069.026	1226.671	E3	-14.7	106	0.01	15.24-15.34
42	T	C30	1082.169	1239.663	E3	-14.6	105	0.01	16.36-16.43
43	T	C32	1077.554	1218.062	E3	-13.0	105	0.01	17.40-17.47
44	T	C34	1.140	1.262	E6	-10.7	105	0.02	18.53-18.60
45	T	C36	1.092	1.165	E6	-6.7	103	0.02	19.97-20.03
46	T	C38	1.048	1.061	E6	-1.2	100	0.03	21.90-22.00
47	T	C40	1.034	0.971	E6	6.1	94	0.04	24.60-24.71
48	H	C21-C40 Aliphatics	1078.845	1184.954	E3	-9.8	105	0.00	11.07-24.93
49	S	Naphthalene (S)	1046.623	1118.274	E3	-6.8	109	0.00	5.42- 5.48
50	S	2-Methylnaphthalene (S	1.069	1.149	E6	-7.5	107	0.00	6.21- 6.27
51	S	1-Chlorooctadecane (S)	1041.538	1021.493	E3	1.9	105	0.00	10.93-10.99

(#) = Out of Range SPCC's out = 0 CCC's out = 0
6y11554.D EPH6Y465.M Wed Nov 06 09:11:15 2013 RPT1

Continuing Calibration Summary

Job Number: JB51845 **Sample:** G6Y469-CC465
Account: ENVNJB EnviroTrac **Lab FileID:** 6Y11575.D
Project: Aeriation Basin (Pool), 750 Cliff Road, Port Reading, NJ

```
                    Evaluate Continuing Calibration Report

  Signal #1 : C:\msdchem\1\DATA\6Y469\6y11575.D\FID1B.ch   Vial: 2
  Signal #2 : C:\msdchem\1\DATA\6Y469\6y11575.D\FID2A.ch
  Acq On    :  6 Nov 2013   3:25 pm                      Operator: owenm
  Sample    : cc465-20                                   Inst    : GC6Y6Z
  Misc      : OP70423,G6y469,16.1,,,2,1                  Multiplr: 1.00
  IntFile Signal #1: autoint1.e   IntFile Signal #2: autoint2.e

  Method       : C:\MSDCHEM\1\METHODS\EPH6Y465.M (ChemStation Integrator)
  Title        : NJDEP Extractable Petroleum Hydrocarbons
  Last Update  : Wed Nov 06 15:57:29 2013
  Response via : Multiple Level Calibration

  Min. RRF     :   0.500  Min. Rel. Area :  50%  Max. R.T. Dev  0.50min
  Max. RRF Dev :  30%     Max. Rel. Area : 200%
```

#		Compound	AvgRF	CCRF		%Dev	Area%	Dev(min)	RT Window
1	T	1,2,3-Trimethylbenzene	315.410	302.778	E3	4.0	80	0.00	3.31- 3.37
2	T	Naphthalene	337.537	324.863	E3	3.8	80	0.00	4.51- 4.57
3	H	C10-C12 Aromatics	326.473	313.821	E3	3.8	80	0.00	3.30- 4.60
4	T	2-Methylnaphthalene	330.533	319.404	E3	3.4	80	0.00	5.28- 5.34
5	T	Acenaphthylene	339.642	326.065	E3	4.0	80	0.00	6.30- 6.36
6	T	Acenaphthene	354.800	340.173	E3	4.1	81	0.00	6.52- 6.58
7	H	C12-C16 Aromatics	341.658	328.547	E3	3.8	80	0.00	4.60- 6.60
8	T	Fluorene	350.294	335.131	E3	4.3	80	0.00	7.10- 7.16
9	T	Phenanthrene	347.410	340.701	E3	1.9	82	0.00	8.20- 8.27
10	T	Anthracene	347.615	339.722	E3	2.3	82	0.00	8.26- 8.32
11	T	Fluoranthene	354.449	350.436	E3	1.1	82	0.00	9.74- 9.80
12	T	Pyrene	354.176	352.624	E3	0.4	83	0.00	10.06-10.12
13	H	C16-C21 Aromatics	350.789	343.723	E3	2.0	83	0.00	6.61-10.15
14	T	Benzo(a)Anthracene	349.749	353.744	E3	-1.1	84	-0.01	12.00-12.06
15	T	Chrysene	351.637	353.527	E3	-0.5	84	-0.01	12.07-12.13
16	T	Benzo(b)Fluoranthene	349.488	355.909	E3	-1.8	86	-0.01	13.81-13.87
17	T	Benzo(k)Fluoranthene	347.320	353.406	E3	-1.8	86	-0.02	13.85-13.91
18	T	Benzo(a)Pyrene	322.097	330.904	E3	-2.7	87	-0.02	14.31-14.37
19	T	Indeno(1,2,3-cd)Pyrene	330.570	342.690	E3	-3.7	88	-0.02	15.98-16.04
20	T	Dibenzo(ah)Anthracene	331.212	344.491	E3	-4.0	88	-0.02	16.03-16.09
21	T	Benzo(ghi)Perylene	334.661	349.574	E3	-4.5	89	-0.02	16.32-16.38
22	H	C21-C36 Aromatics	339.592	348.031	E3	-2.5	89	0.00	10.15-17.50
23	S	2-Fluorobiphenyl (S)	323.031	311.601	E3	3.5	82	0.00	5.73- 5.79
24	S	2-Bromonaphthalene (S)	240.765	243.781	E3	-1.3	92	0.00	6.45- 6.51
25	S	o-Terphenyl (S)	364.960	353.976	E3	3.0	81	0.00	8.75- 8.81

***** Signal #2 *****

#		Compound	AvgRF	CCRF		%Dev	Area%	Dev(min)	RT Window
27	T	C9	913.237	1076.432	E3	-17.9	107	0.01	3.14- 3.20
28	T	C10	942.220	1096.084	E3	-16.3	108	0.00	3.88- 3.94
29	T	C12	954.328	1112.853	E3	-16.6	108	0.00	5.38- 5.44
30	H	C9-C12 Aliphatics	936.595	1095.123	E3	-16.9	108	0.00	3.05- 5.51
31	T	C14	980.884	1138.097	E3	-16.0	108	0.00	6.76- 6.82
32	T	C16	1000.783	1158.413	E3	-15.8	107	0.00	7.99- 8.05
33	H	C12-C16 Aliphatics	990.833	1148.255	E3	-15.9	107	0.00	5.50- 8.05
34	T	C18	1018.748	1166.596	E3	-14.5	106	-0.01	9.14- 9.20
35	T	C20	1032.447	1181.282	E3	-14.4	106	-0.01	10.35-10.41
36	T	C21	1183.807	1189.773	E3	-0.5	106	-0.02	10.97-11.03
37	H	C16-C21 Aliphatics	1078.334	1179.217	E3	-9.4	106	0.00	8.05-11.07
38	T	C22	1133.906	1292.121	E3	-14.0	106	-0.02	11.60-11.67
39	T	C24	1046.879	1190.573	E3	-13.7	105	-0.01	12.86-12.93

Continuing Calibration Summary

Job Number: JB51845 **Sample:** G6Y469-CC465
Account: ENVNJB EnviroTrac **Lab FileID:** 6Y11575.D
Project: Aeriation Basin (Pool), 750 Cliff Road, Port Reading, NJ

40	T	C26	1065.035	1212.887	E3	-13.9	105	-0.02	14.08-14.14
41	T	C28	1069.026	1214.739	E3	-13.6	105	-0.02	15.23-15.33
42	T	C30	1082.169	1226.495	E3	-13.3	105	-0.02	16.35-16.42
43	T	C32	1077.554	1206.547	E3	-12.0	105	-0.02	17.39-17.46
44	T	C34	1.140	1.254	E6	-10.0	105	-0.03	18.51-18.58
45	T	C36	1.092	1.172	E6	-7.3	105	-0.05	19.96-20.02
46	T	C38	1.048	1.137	E6	-8.5	109	-0.07	21.87-21.98
47	T	C40	1.034	1.071	E6	-3.6	105	-0.04	24.58-24.68
48	H	C21-C40 Aliphatics	1078.845	1197.690	E3	-11.0	105	0.00	11.07-24.93
49	S	Naphthalene (S)	1046.623	1132.617	E3	-8.2	107	0.00	5.42- 5.48
50	S	2-Methylnaphthalene (S	1.069	1.171	E6	-9.5	109	0.00	6.21- 6.27
51	S	1-Chlorooctadecane (S)	1041.538	1027.712	E3	1.3	106	0.00	10.92-10.98

(#) = Out of Range SPCC's out = 0 CCC's out = 0
6y11502.D EPH6Y465.M Tue Nov 12 16:28:43 2013 RPT1

6.7.6

6

Continuing Calibration Summary

Job Number: JB51845 **Sample:** G6Y469-CC465
Account: ENVNJB EnviroTrac **Lab FileID:** 6Y11592.D
Project: Aeriation Basin (Pool), 750 Cliff Road, Port Reading, NJ

```
                    Evaluate Continuing Calibration Report

  Signal #1 : C:\msdchem\1\DATA\6Y469\6y11592.D\FID1B.ch   Vial: 3
  Signal #2 : C:\msdchem\1\DATA\6Y469\6y11592.D\FID2A.ch
  Acq On    :  7 Nov 2013   1:29 am                      Operator: owenm
  Sample    : cc465-50                                   Inst    : GC6Y6Z
  Misc      : OP70423,G6y469,16.1,,,2,1                  Multiplr: 1.00
  IntFile Signal #1: autoint1.e   IntFile Signal #2: autoint2.e

  Method       : C:\MSDCHEM\1\METHODS\EPH6Y465.M (ChemStation Integrator)
  Title        : NJDEP Extractable Petroleum Hydrocarbons
  Last Update  : Mon Nov 18 11:17:47 2013
  Response via : Multiple Level Calibration

  Min. RRF     :   0.500  Min. Rel. Area :  50%  Max. R.T. Dev  0.50min
  Max. RRF Dev :  30%     Max. Rel. Area : 200%

         Compound                  AvgRF    CCRF      %Dev Area% Dev(min)RT Window
  ---------------------------------------------------------------------------
  1 T   1,2,3-Trimethylbenzene 315.410 313.862 E3   0.5  100   0.00    3.31- 3.37
  2 T   Naphthalene            337.537 328.292 E3   2.7   95   0.00    4.52- 4.58
  3 H   C10-C12 Aromatics      326.473 321.077 E3   1.7  101   0.00    3.30- 4.60
  4 T   2-Methylnaphthalene    330.533 318.726 E3   3.6   94   0.00    5.28- 5.34
  5 T   Acenaphthylene         339.642 323.580 E3   4.7   93   0.00    6.30- 6.36
  6 T   Acenaphthene           354.800 333.155 E3   6.1   93   0.00    6.52- 6.58
  7 H   C12-C16 Aromatics      341.658 325.154 E3   4.8   96   0.00    4.60- 6.60
  8 T   Fluorene               350.294 329.225 E3   6.0   92   0.00    7.10- 7.16
  9 T   Phenanthrene           347.410 330.683 E3   4.8   92   0.00    8.20- 8.27
 10 T   Anthracene             347.615 330.097 E3   5.0   92   0.00    8.26- 8.32
 11 T   Fluoranthene           354.449 335.346 E3   5.4   92   0.00    9.75- 9.81
 12 T   Pyrene                 354.176 336.348 E3   5.0   92   0.00   10.06-10.12
 13 H   C16-C21 Aromatics      350.789 332.340 E3   5.3   92   0.00    6.61-10.15
 14 T   Benzo(a)Anthracene     349.749 330.976 E3   5.4   92   0.00   12.00-12.06
 15 T   Chrysene               351.637 331.381 E3   5.8   92   0.00   12.07-12.13
 16 T   Benzo(b)Fluoranthene   349.488 331.113 E3   5.3   95   0.00   13.82-13.88
 17 T   Benzo(k)Fluoranthene   347.320 327.728 E3   5.6   94   0.00   13.86-13.92
 18 T   Benzo(a)Pyrene         322.097 304.677 E3   5.4   95   0.00   14.32-14.38
 19 T   Indeno(1,2,3-cd)Pyrene 330.570 322.200 E3   2.5   99   0.00   15.98-16.04
 20 T   Dibenzo(ah)Anthracene  331.212 318.932 E3   3.7   99   0.00   16.03-16.09
 21 T   Benzo(ghi)Perylene     334.661 323.923 E3   3.2  100   0.00   16.33-16.39
 22 H   C21-C36 Aromatics      339.592 323.866 E3   4.6   96   0.00   10.15-17.50
 23 S   2-Fluorobiphenyl (S)   323.031 301.560 E3   6.6   93   0.00    5.73- 5.79
 24 S   2-Bromonaphthalene (S) 240.765 205.854 E3  14.5   92   0.00    6.45- 6.51
 25 S   o-Terphenyl  (S)       364.960 346.253 E3   5.1   92   0.00    8.75- 8.81

 *****  Signal #2   *****

 27 T   C9                     913.237 1084.250 E3 -18.7  108   0.00    3.14- 3.20
 28 T   C10                    942.220 1105.369 E3 -17.3  110   0.00    3.88- 3.94
 29 T   C12                    954.328 1120.335 E3 -17.4  109   0.00    5.39- 5.45
 30 H   C9-C12 Aliphatics      936.595 1103.318 E3 -17.8  108   0.00    3.05- 5.51
 31 T   C14                    980.884 1141.598 E3 -16.4  109   0.00    6.76- 6.82
 32 T   C16                    1000.783 1163.130 E3 -16.2  108   0.00    7.99- 8.05
 33 H   C12-C16 Aliphatics     990.833 1152.364 E3 -16.3  108   0.00    5.50- 8.05
 34 T   C18                    1018.748 1179.068 E3 -15.7  108   0.00    9.15- 9.21
 35 T   C20                    1032.447 1195.053 E3 -15.7  107   0.00   10.36-10.42
 36 T   C21                    1183.807 1204.661 E3  -1.8  107   0.00   10.98-11.04
 37 H   C16-C21 Aliphatics     1078.334 1192.927 E3 -10.6  107   0.00    8.05-11.07
 38 T   C22                    1133.906 1313.644 E3 -15.9  107   0.00   11.61-11.68
 39 T   C24                    1046.879 1215.598 E3 -16.1  107   0.00   12.87-12.94
```

Continuing Calibration Summary

Job Number: JB51845 **Sample:** G6Y469-CC465
Account: ENVNJB EnviroTrac **Lab FileID:** 6Y11592.D
Project: Aeriation Basin (Pool), 750 Cliff Road, Port Reading, NJ

40	T	C26	1065.035	1243.457	E3	-16.8	108	0.00	14.09-14.15
41	T	C28	1069.026	1248.440	E3	-16.8	107	0.00	15.25-15.34
42	T	C30	1082.169	1263.592	E3	-16.8	107	0.00	16.36-16.43
43	T	C32	1077.554	1242.830	E3	-15.3	107	0.00	17.40-17.47
44	T	C34	1.140	1.295	E6	-13.6	107	0.00	18.53-18.60
45	T	C36	1.092	1.197	E6	-9.6	106	0.00	19.98-20.04
46	T	C38	1.048	1.093	E6	-4.3	103	0.00	21.91-22.01
47	T	C40	1.034	0.995	E6	3.8	96	0.00	24.62-24.72
48	H	C21-C40 Aliphatics	1078.845	1210.803	E3	-12.2	103	0.00	11.07-24.93
49	S	Naphthalene (S)	1046.623	1143.716	E3	-9.3	111	0.00	5.42- 5.48
50	S	2-Methylnaphthalene (S	1.069	1.174	E6	-9.8	109	0.00	6.21- 6.27
51	S	1-Chlorooctadecane (S)	1041.538	1033.096	E3	0.8	107	0.00	10.93-10.99

(#) = Out of Range SPCC's out = 0 CCC's out = 0
6y11503.D EPH6Y465.M Mon Nov 18 11:19:00 2013 RPT1

6.7.7
6

New Jersey
ACCUTEST
LABORATORIES

GC Semi-volatiles

Raw Data

Manual Integrations APPROVED (compounds with "m" flag)
Owen McKenna
11/07/13 16:22

Quantitation Report (QT Reviewed)

```
Data Path : C:\msdchem\1\DATA\6Y468\
Data File : 6y11556.D
Signal(s) : Signal #1: FID1B.ch  Signal #2: FID2A.ch
Acq On    :  5 Nov 2013   8:27 pm
Operator  : owenm
Sample    : jb51845-1
Misc      : OP70366,G6y468,16.3,,,2,1
ALS Vial  : 13   Sample Multiplier: 1

Integration File signal 1: autoint1.e
Integration File signal 2: autoint2.e
Quant Time: Nov 06 09:03:13 2013
Quant Method : C:\MSDCHEM\1\METHODS\EPH6Y465.M
Quant Title  : NJDEP Extractable Petroleum Hydrocarbons
QLast Update : Mon Nov 04 09:20:51 2013
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj.     : 1ul/col
Signal #1 Phase : HP5              Signal #2 Phase: HP5
Signal #1 Info  : 30mx.25mm.x.25um  Signal #2 Info : 30mx.32mm.x25um
```

		Compound	R.T.	Response	Conc	Units	
		System Monitoring Compounds					
23)	S	2-Fluorobiphenyl (S)	5.766	12561544	38.886	ug/L	m
24)	S	2-Bromonaphthalene (S)	6.481	9132101	37.930	ug/L	m
25)	S	o-Terphenyl (S)	8.785	17125209	46.924	ug/L	m
51)	S	1-Chlorooctadecane (S)	10.988f	44196558	42.434	ug/L	m
		Target Compounds					
2)	T	Naphthalene	4.542	3002021	8.894	ug/L	m
4)	T	2-Methylnaphthalene	5.281f	4728693	14.306	ug/L	m
5)	T	Acenaphthylene	6.354f	10801718	31.803	ug/l	m
6)	T	Acenaphthene	6.542	3792059	10.688	ug/l	m
7)	H	C12-C16 Aromatics	5.600	290739004	850.964	ug/L	
8)	T	Fluorene	7.153f	4412753	12.597	ug/l	m
9)	T	Phenanthrene	8.239	9577710	27.569	ug/l	m
10)	T	Anthracene	8.290	1584363	4.558	ug/l	m
11)	T	Fluoranthene	9.795	7275646	20.527	ug/l	m
12)	T	Pyrene	10.092	8812140	24.881	ug/l	m
13)	H	C16-C21 Aromatics	8.375	1828311159	5212.001	ug/L	
14)	T	Benzo(a)Anthracene	12.036	1497653	4.282	ug/l	m
15)	T	Chrysene	12.094f	2461635	7.000	ug/l	m
22)	H	C21-C36 Aromatics	13.825	1176065451	3463.175	ug/L	
30)	H	C9-C12 Aliphatics	4.275	500115431	533.972	ug/L	
33)	H	C12-C16 Aliphatics	6.775	4851058311	4895.937	ug/L	
37)	H	C16-C21 Aliphatics	9.560	8004908555	7423.403	ug/L	
48)	H	C21-C40 Aliphatics	18.005	8065436062	7475.995	ug/L	

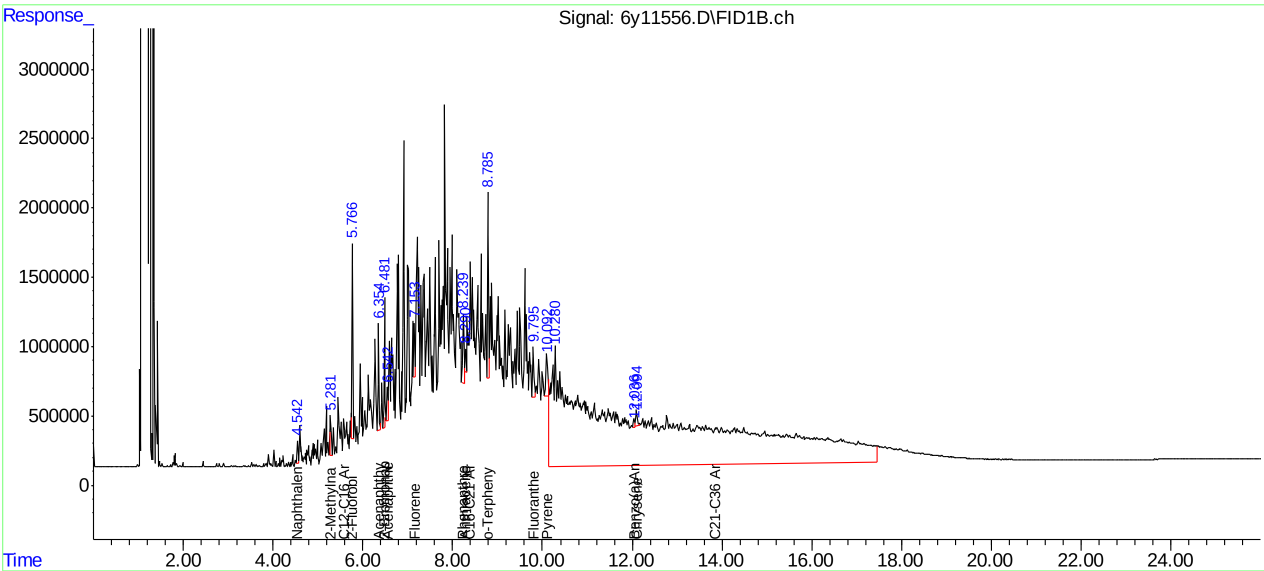
(f)=RT Delta > 1/2 Window (m)=manual int.

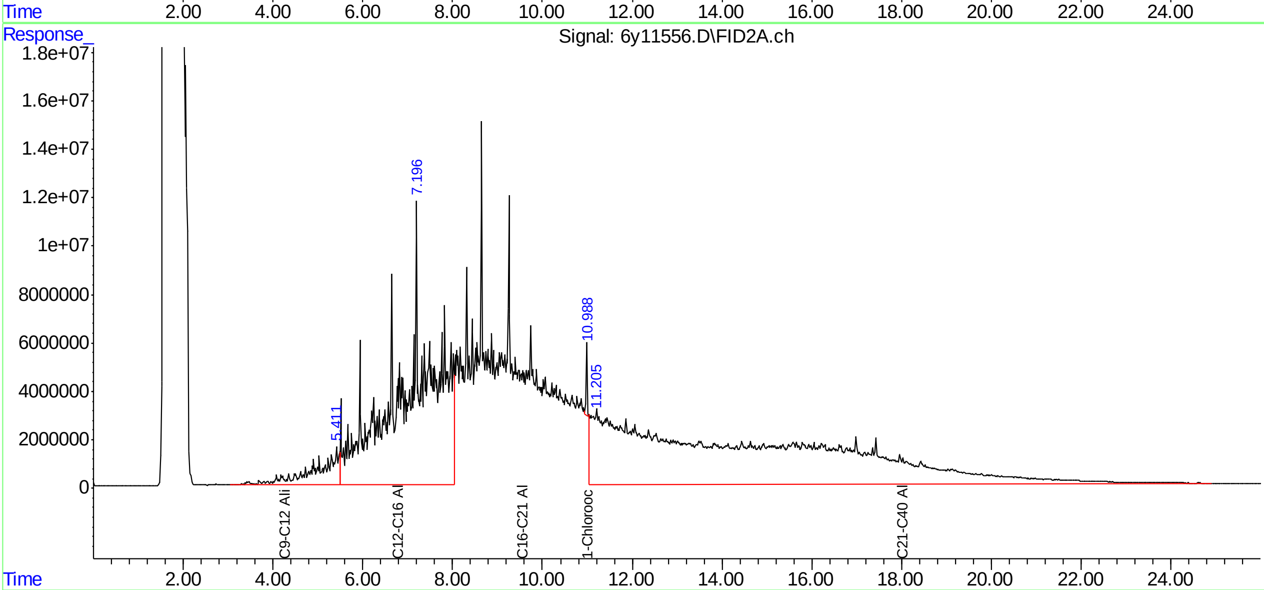
Quantitation Report (QT Reviewed)

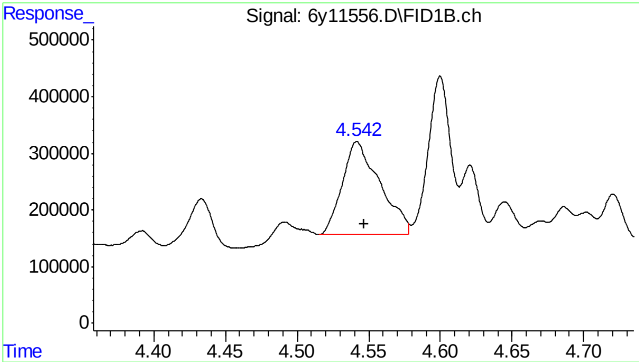
```
Data Path : C:\msdchem\1\DATA\6Y468\
Data File : 6y11556.D
Signal(s) : Signal #1: FID1B.ch  Signal #2: FID2A.ch
Acq On    :  5 Nov 2013   8:27 pm
Operator  : owenm
Sample    : jb51845-1
Misc      : OP70366,G6y468,16.3,,,2,1
ALS Vial  : 13   Sample Multiplier: 1

Integration File signal 1: autoint1.e
Integration File signal 2: autoint2.e
Quant Time: Nov 06 09:03:13 2013
Quant Method : C:\MSDCHEM\1\METHODS\EPH6Y465.M
Quant Title  : NJDEP Extractable Petroleum Hydrocarbons
QLast Update : Mon Nov 04 09:20:51 2013
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj.     : 1ul/col
Signal #1 Phase : HP5                Signal #2 Phase: HP5
Signal #1 Info  : 30mx.25mm.x.25um   Signal #2 Info : 30mx.32mm.x25um
```

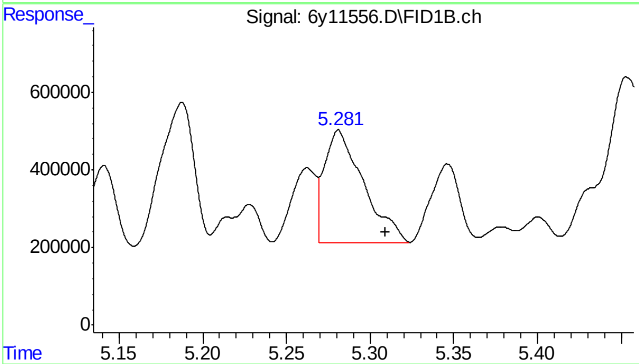







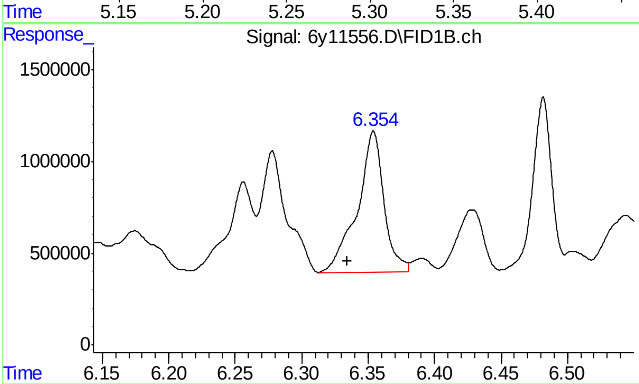

```
#2   Naphthalene

        R.T.:     4.542 min
  Delta R.T.:    -0.005 min
    Response:    3002021
        Conc:    8.89 ug/L m
```



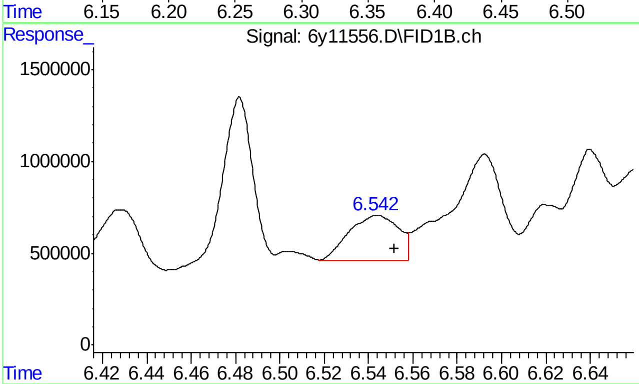

```
#4   2-Methylnaphthalene

        R.T.:     5.281 min
  Delta R.T.:    -0.028 min
    Response:    4728693
        Conc:   14.31 ug/L m
```



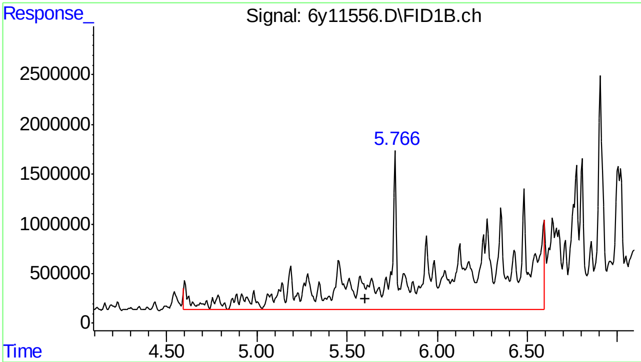

```
#5   Acenaphthylene

        R.T.:     6.354 min
  Delta R.T.:     0.019 min
    Response:   10801718
        Conc:   31.80 ug/l m
```



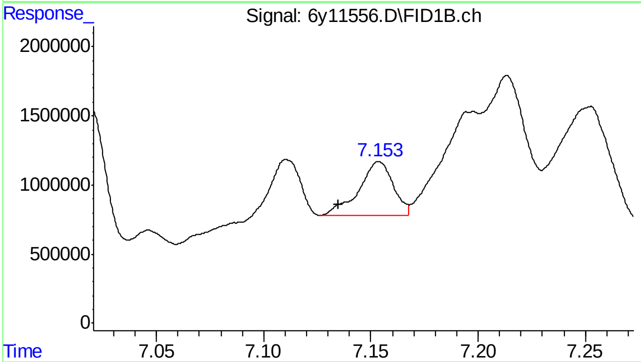

```
#6   Acenaphthene

        R.T.:     6.542 min
  Delta R.T.:    -0.010 min
    Response:    3792059
        Conc:   10.69 ug/l m
```



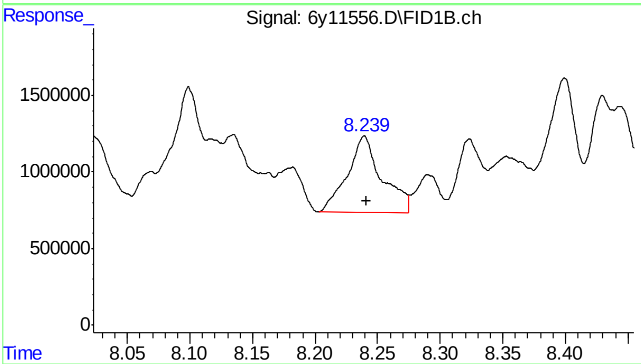

```
#7   C12-C16 Aromatics

       R.T.:     5.600 min
Delta R.T.:     0.000 min
   Response:  290739004
       Conc:  850.96 ug/L m
```



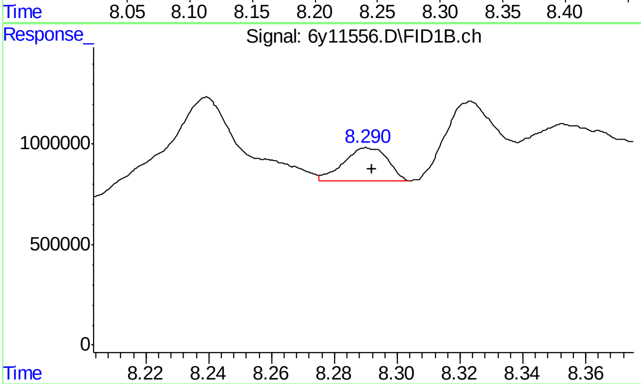

```
#8   Fluorene

       R.T.:     7.153 min
Delta R.T.:     0.018 min
   Response:    4412753
       Conc:   12.60 ug/l m
```



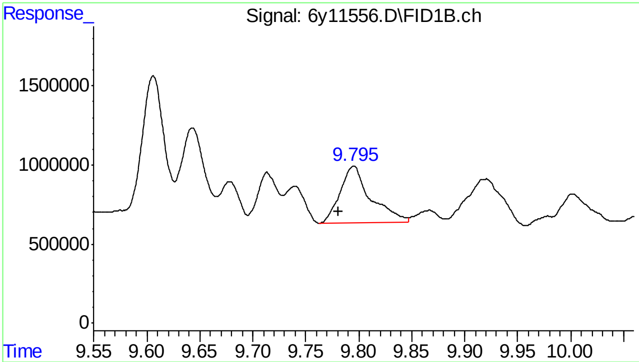

```
#9   Phenanthrene

       R.T.:     8.239 min
Delta R.T.:    -0.002 min
   Response:    9577710
       Conc:   27.57 ug/l m
```



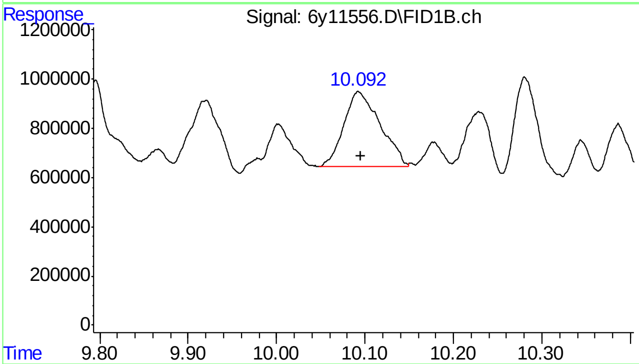

```
#10   Anthracene

       R.T.:     8.290 min
Delta R.T.:    -0.002 min
   Response:    1584363
       Conc:    4.56 ug/l m
```



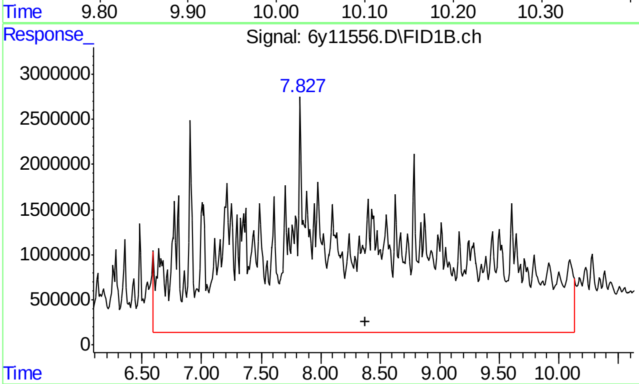

```
#11  Fluoranthene

       R.T.:     9.795 min
Delta R.T.:     0.014 min
   Response:    7275646
       Conc:   20.53 ug/l m
```



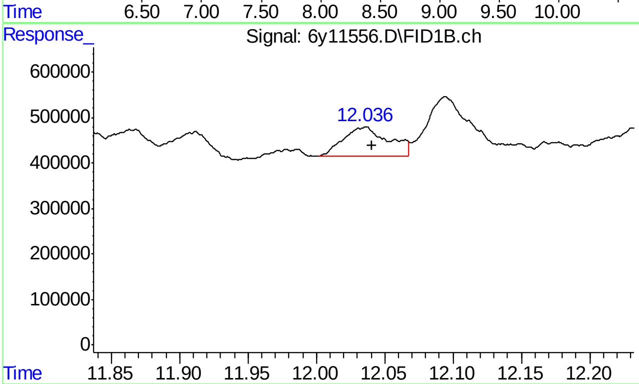

```
#12  Pyrene

       R.T.:    10.092 min
Delta R.T.:    -0.003 min
   Response:    8812140
       Conc:   24.88 ug/l m
```



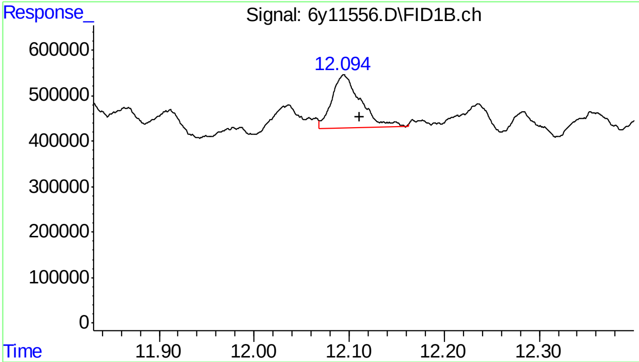

```
#13  C16-C21 Aromatics

       R.T.:     8.375 min
Delta R.T.:     0.000 min
   Response: 1828311159
       Conc: 5212.00 ug/L m
```



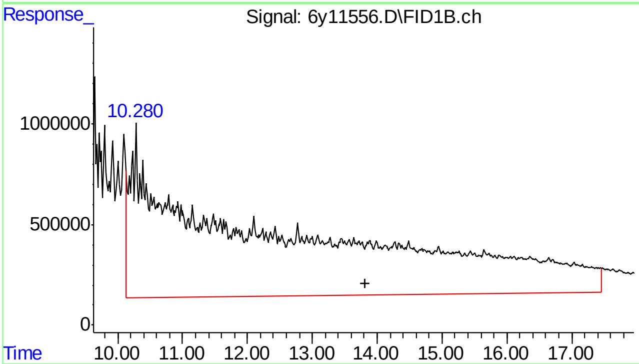

```
#14  Benzo(a)Anthracene

       R.T.:    12.036 min
Delta R.T.:    -0.005 min
   Response:    1497653
       Conc:    4.28 ug/l m
```



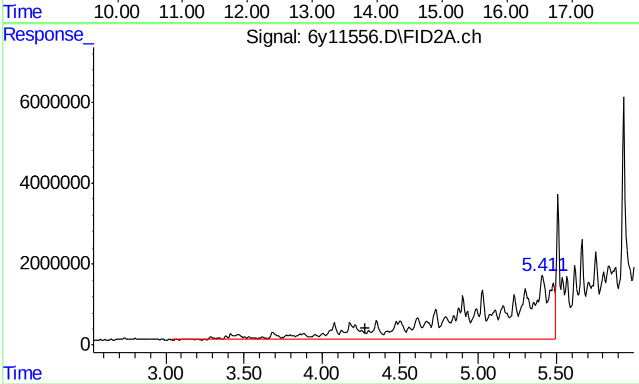
#15 Chrysene

R.T.: 12.094 min
Delta R.T.: -0.017 min
Response: 2461635
Conc: 7.00 ug/l m



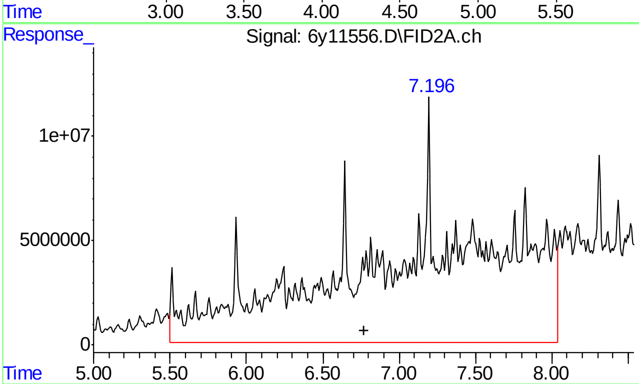
#22 C21-C36 Aromatics

R.T.: 13.825 min
Delta R.T.: 0.000 min
Response: 1176065451
Conc: 3463.17 ug/L m



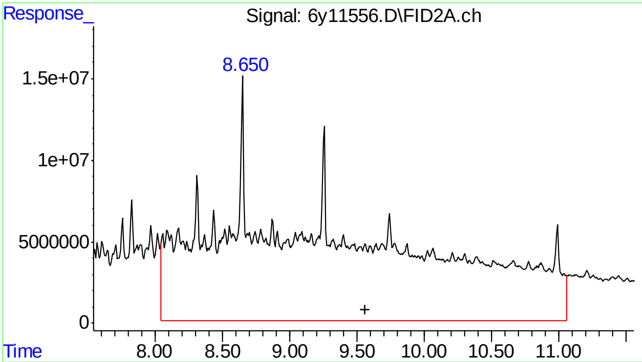
#30 C9-C12 Aliphatics

R.T.: 4.275 min
Delta R.T.: 0.000 min
Response: 500115431
Conc: 533.97 ug/L m



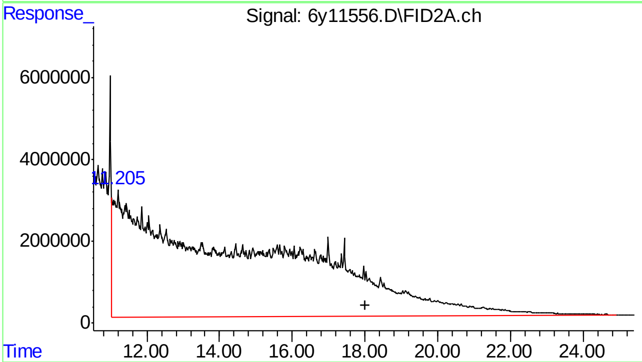
#33 C12-C16 Aliphatics

R.T.: 6.775 min
Delta R.T.: 0.000 min
Response: 4851058311
Conc: 4895.94 ug/L m




```
#37   C16-C21 Aliphatics

        R.T.:     9.560 min
Delta R.T.:     0.000 min
  Response:  8004908555
      Conc:  7423.40 ug/L m
```




```
#48   C21-C40 Aliphatics

        R.T.:    18.005 min
Delta R.T.:     0.000 min
  Response:  8065436062
      Conc:  7475.99 ug/L m
```

Manual Integrations APPROVED (compounds with "m" flag)
Owen McKenna
11/08/13 16:14

Quantitation Report (QT Reviewed)

```
Data Path : C:\msdchem\1\DATA\6Y469\
Data File : 6y11583.D
Signal(s) : Signal #1: FID1B.ch  Signal #2: FID2A.ch
Acq On    :  6 Nov 2013   8:45 pm
Operator  : owenm
Sample    : jb51845-2
Misc      : OP70366,G6y469,15.6,,,2,1
ALS Vial  : 16   Sample Multiplier: 1

Integration File signal 1: autoint1.e
Integration File signal 2: autoint2.e
Quant Time: Nov 07 08:42:51 2013
Quant Method : C:\MSDCHEM\1\METHODS\EPH6Y465.M
Quant Title  : NJDEP Extractable Petroleum Hydrocarbons
QLast Update : Mon Nov 04 09:20:51 2013
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj.     : 1ul/col
Signal #1 Phase : HP5                Signal #2 Phase: HP5
Signal #1 Info  : 30mx.25mm.x.25um   Signal #2 Info : 30mx.32mm.x25um
```

		Compound	R.T.	Response	Conc	Units	
		System Monitoring Compounds					
23)	S	2-Fluorobiphenyl (S)	5.764	12664832	39.206	ug/L	
24)	S	2-Bromonaphthalene (S)	6.480	7277216	30.225	ug/L	
25)	S	o-Terphenyl (S)	8.780	14433463	39.548	ug/L	m
51)	S	1-Chlorooctadecane (S)	10.964	39141107	37.580	ug/L	m
		Target Compounds					
5)	T	Acenaphthylene	6.352f	1058121	3.115	ug/l	m
6)	T	Acenaphthene	6.547	1216718	3.429	ug/l	m
8)	T	Fluorene	7.130	1818376	5.191	ug/l	m
9)	T	Phenanthrene	8.236	8187022	23.566	ug/l	m
10)	T	Anthracene	8.286	2453799	7.059	ug/l	m
11)	T	Fluoranthene	9.773	2296965	6.480	ug/l	m
12)	T	Pyrene	10.087	5365202	15.148	ug/l	m
13)	H	C16-C21 Aromatics	8.375	236650295	674.623	ug/L	
14)	T	Benzo(a)Anthracene	12.027	1992418	5.697	ug/l	m
15)	T	Chrysene	12.094f	2216580	6.304	ug/l	m
17)	T	Benzo(k)Fluoranthene	13.872f	727694	2.095	ug/l	m
18)	T	Benzo(a)Pyrene	14.338f	1315204	4.083	ug/l	m
22)	H	C21-C36 Aromatics	13.825	458504003	1350.163	ug/L	
33)	H	C12-C16 Aliphatics	6.775	265140214	267.593	ug/L	
37)	H	C16-C21 Aliphatics	9.560	639693592	593.224	ug/L	
48)	H	C21-C40 Aliphatics	18.005	1533348432	1421.288	ug/L	

(f)=RT Delta > 1/2 Window (m)=manual int.

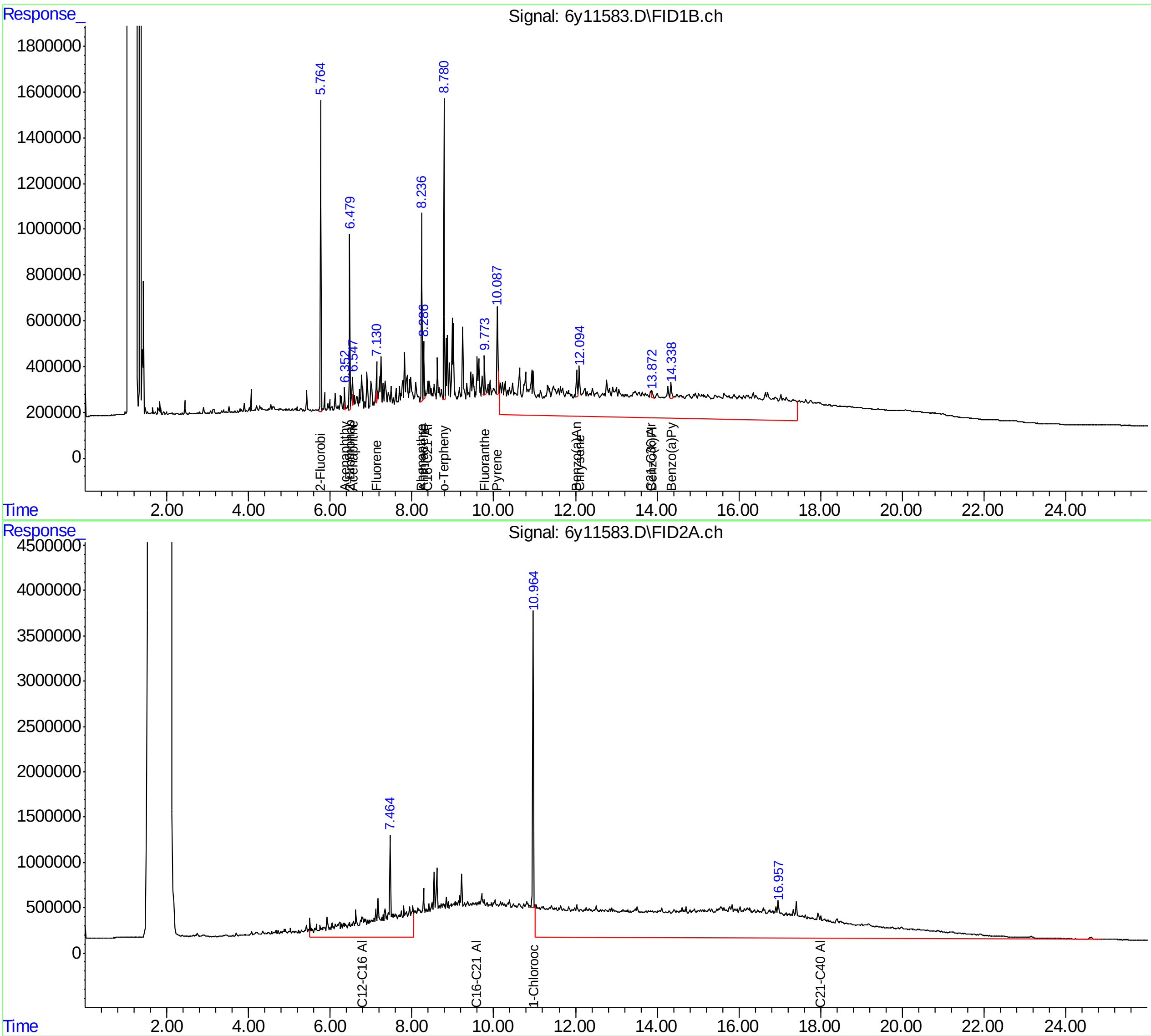
EPH6Y465.M Thu Nov 07 08:42:56 2013 RPT1 Page: 1

Quantitation Report (QT Reviewed)

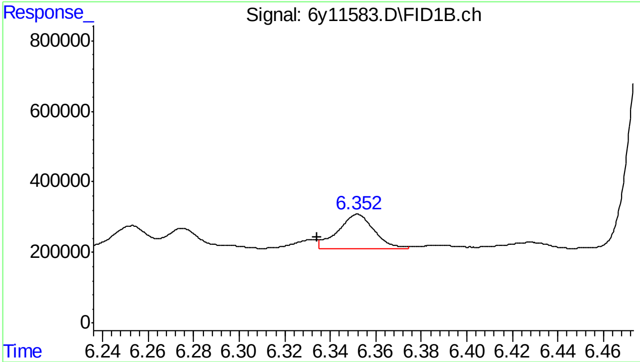
```
Data Path : C:\msdchem\1\DATA\6Y469\
Data File : 6y11583.D
Signal(s) : Signal #1: FID1B.ch  Signal #2: FID2A.ch
Acq On    :  6 Nov 2013   8:45 pm
Operator  : owenm
Sample    : jb51845-2
Misc      : OP70366,G6y469,15.6,,,2,1
ALS Vial  : 16   Sample Multiplier: 1

Integration File signal 1: autoint1.e
Integration File signal 2: autoint2.e
Quant Time: Nov 07 08:42:51 2013
Quant Method : C:\MSDCHEM\1\METHODS\EPH6Y465.M
Quant Title  : NJDEP Extractable Petroleum Hydrocarbons
QLast Update : Mon Nov 04 09:20:51 2013
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj.     : 1ul/col
Signal #1 Phase : HP5              Signal #2 Phase: HP5
Signal #1 Info  : 30mx.25mm.x.25um Signal #2 Info : 30mx.32mm.x25um
```

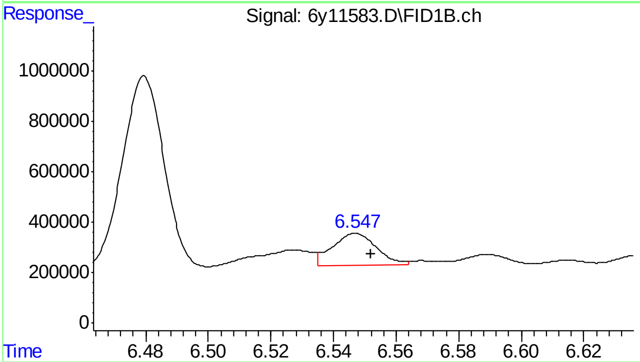


EPH6Y465.M Thu Nov 07 08:42:57 2013 RPT1



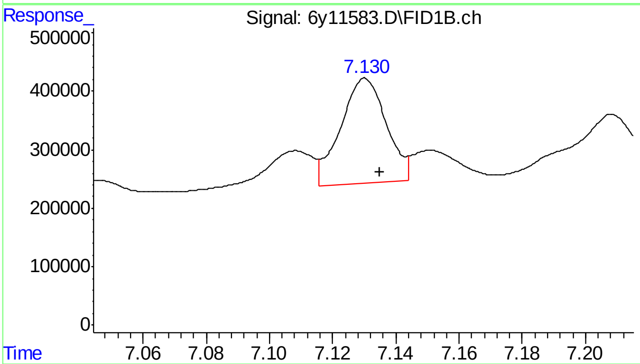

```
#5  Acenaphthylene

      R.T.:     6.352 min
Delta R.T.:     0.017 min
  Response:    1058121
      Conc:    3.12 ug/l m
```



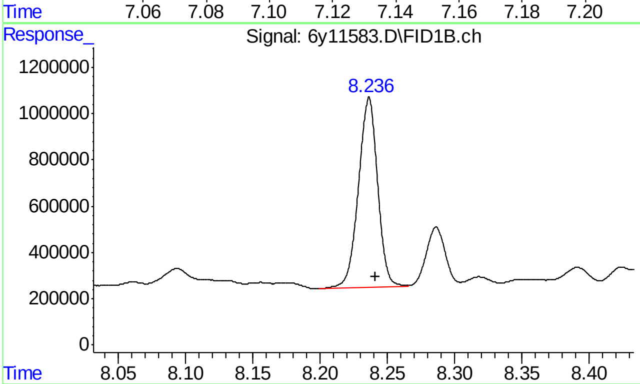

```
#6  Acenaphthene

      R.T.:     6.547 min
Delta R.T.:    -0.005 min
  Response:    1216718
      Conc:    3.43 ug/l m
```



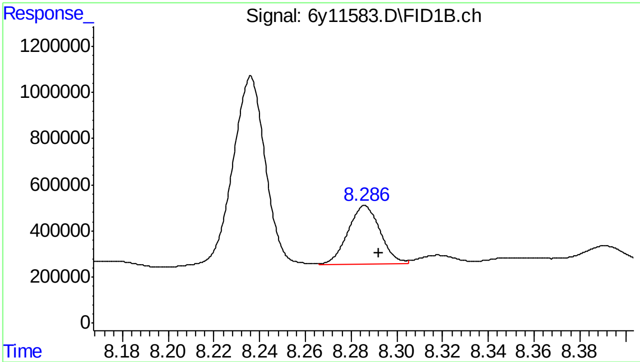

```
#8  Fluorene

      R.T.:     7.130 min
Delta R.T.:    -0.005 min
  Response:    1818376
      Conc:    5.19 ug/l m
```



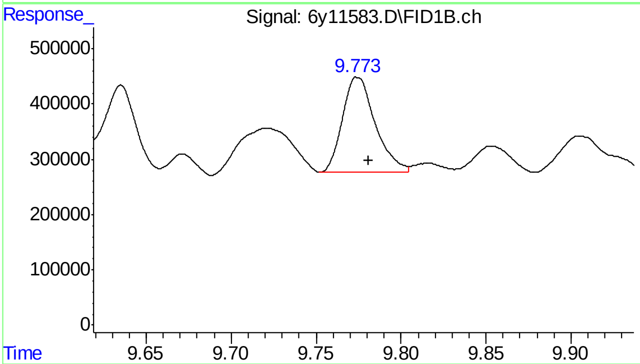

```
#9  Phenanthrene

      R.T.:     8.236 min
Delta R.T.:    -0.005 min
  Response:    8187022
      Conc:   23.57 ug/l m
```



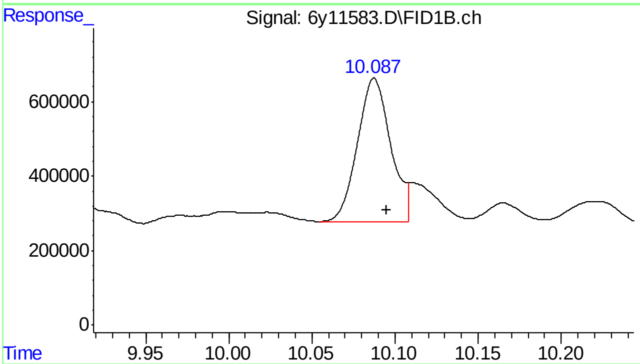
#10 Anthracene

```
       R.T.:    8.286 min
Delta R.T.:   -0.006 min
   Response:   2453799
       Conc:   7.06 ug/l m
```



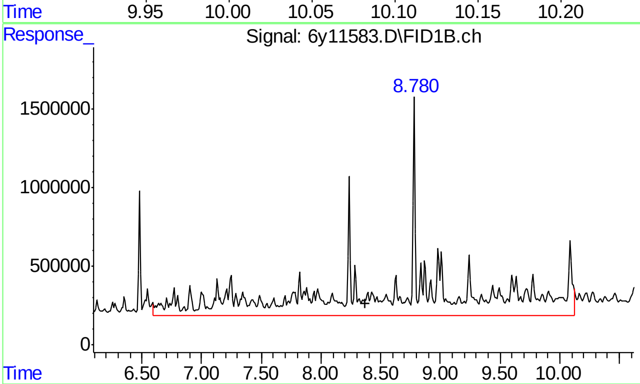
#11 Fluoranthene

```
       R.T.:    9.773 min
Delta R.T.:   -0.008 min
   Response:   2296965
       Conc:   6.48 ug/l m
```



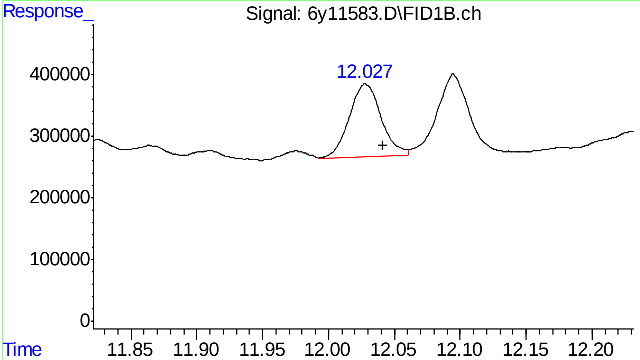
#12 Pyrene

```
       R.T.:   10.087 min
Delta R.T.:   -0.008 min
   Response:   5365202
       Conc:  15.15 ug/l m
```



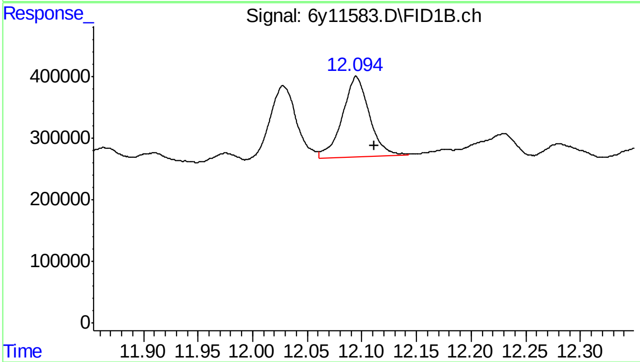
#13 C16-C21 Aromatics

```
       R.T.:    8.375 min
Delta R.T.:    0.000 min
   Response: 236650295
       Conc: 674.62 ug/L m
```



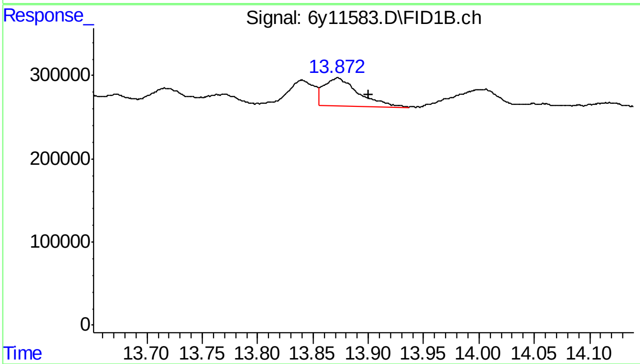

```
#14  Benzo(a)Anthracene

      R.T.:   12.027 min
Delta R.T.:   -0.014 min
  Response:   1992418
      Conc:   5.70 ug/l m
```



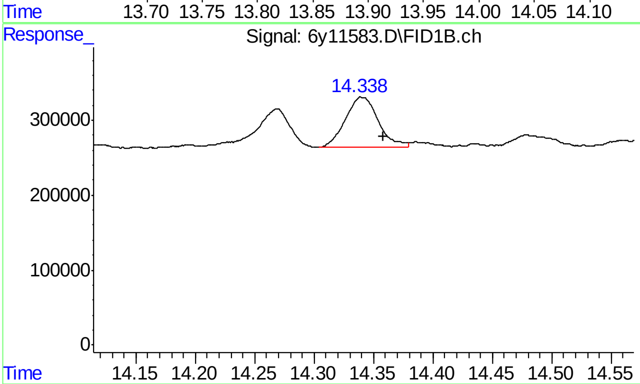

```
#15  Chrysene

      R.T.:   12.094 min
Delta R.T.:   -0.017 min
  Response:   2216580
      Conc:   6.30 ug/l m
```




```
#17  Benzo(k)Fluoranthene

      R.T.:   13.872 min
Delta R.T.:   -0.029 min
  Response:    727694
      Conc:   2.10 ug/l m
```

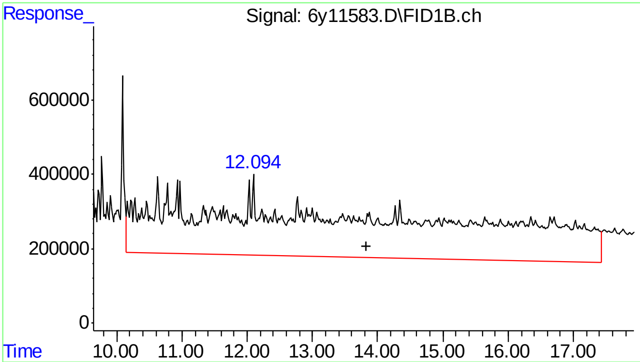



```
#18  Benzo(a)Pyrene

      R.T.:   14.338 min
Delta R.T.:   -0.019 min
  Response:   1315204
      Conc:   4.08 ug/l m
```

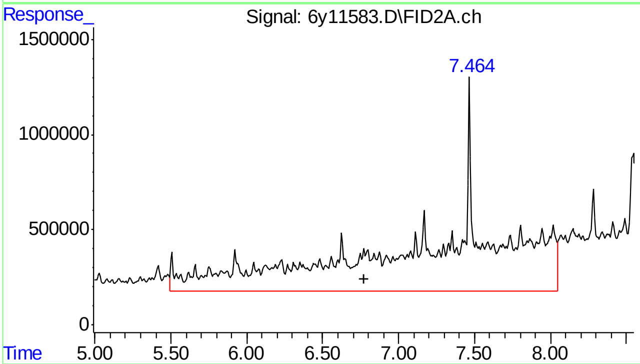
7.1.2

7



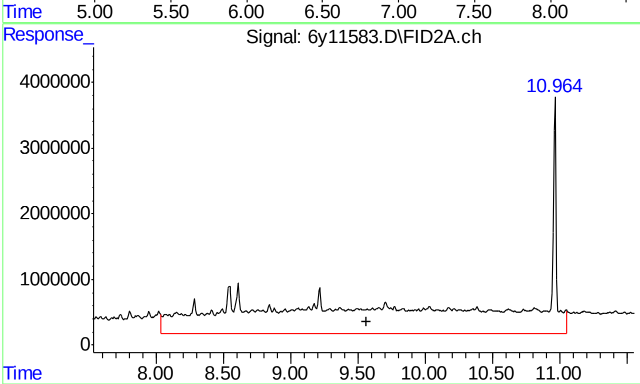

```
#22  C21-C36 Aromatics

      R.T.:   13.825 min
Delta R.T.:    0.000 min
  Response: 458504003
      Conc: 1350.16 ug/L m
```



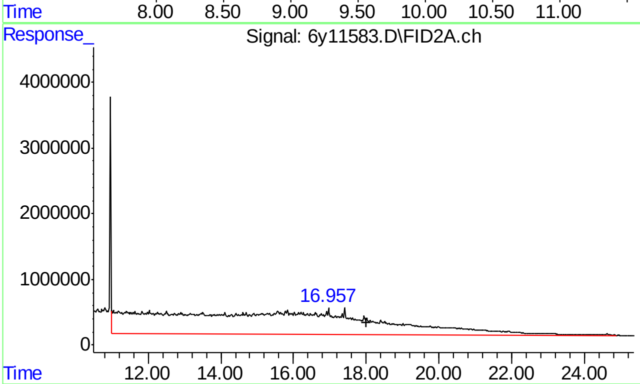

```
#33  C12-C16 Aliphatics

      R.T.:    6.775 min
Delta R.T.:    0.000 min
  Response: 265140214
      Conc: 267.59 ug/L m
```




```
#37  C16-C21 Aliphatics

      R.T.:    9.560 min
Delta R.T.:    0.000 min
  Response: 639693592
      Conc: 593.22 ug/L m
```




```
#48  C21-C40 Aliphatics

      R.T.:   18.005 min
Delta R.T.:    0.000 min
  Response: 1533348432
      Conc: 1421.29 ug/L m
```

Quantitation Report   (QT Reviewed)

```
Data Path : C:\msdchem\1\DATA\6Y468\
Data File : 6y11545.D
Signal(s) : Signal #1: FID1B.ch  Signal #2: FID2A.ch
Acq On    :  5 Nov 2013   2:45 pm
Operator  : owenm
Sample    : op70366-mb1
Misc      : OP70366,G6y468,15.0,,,2,1
ALS Vial  : 4   Sample Multiplier: 1

Integration File signal 1: autoint1.e
Integration File signal 2: autoint2.e
Quant Time: Nov 06 08:48:54 2013
Quant Method : C:\MSDCHEM\1\METHODS\EPH6Y465.M
Quant Title  : NJDEP Extractable Petroleum Hydrocarbons
QLast Update : Mon Nov 04 09:20:51 2013
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj.     : 1ul/col
Signal #1 Phase : HP5               Signal #2 Phase: HP5
Signal #1 Info  : 30mx.25mm.x.25um  Signal #2 Info : 30mx.32mm.x25um
```

Compound	R.T.	Response	Conc Units
System Monitoring Compounds			
23) S 2-Fluorobiphenyl (S)	5.765	12710794	39.349 ug/L
24) S 2-Bromonaphthalene (S)	6.480	10079145	41.863 ug/L
25) S o-Terphenyl (S)	8.780	14951056	40.966 ug/L
51) S 1-Chlorooctadecane (S)	10.958	35379199	33.968 ug/L
Target Compounds			

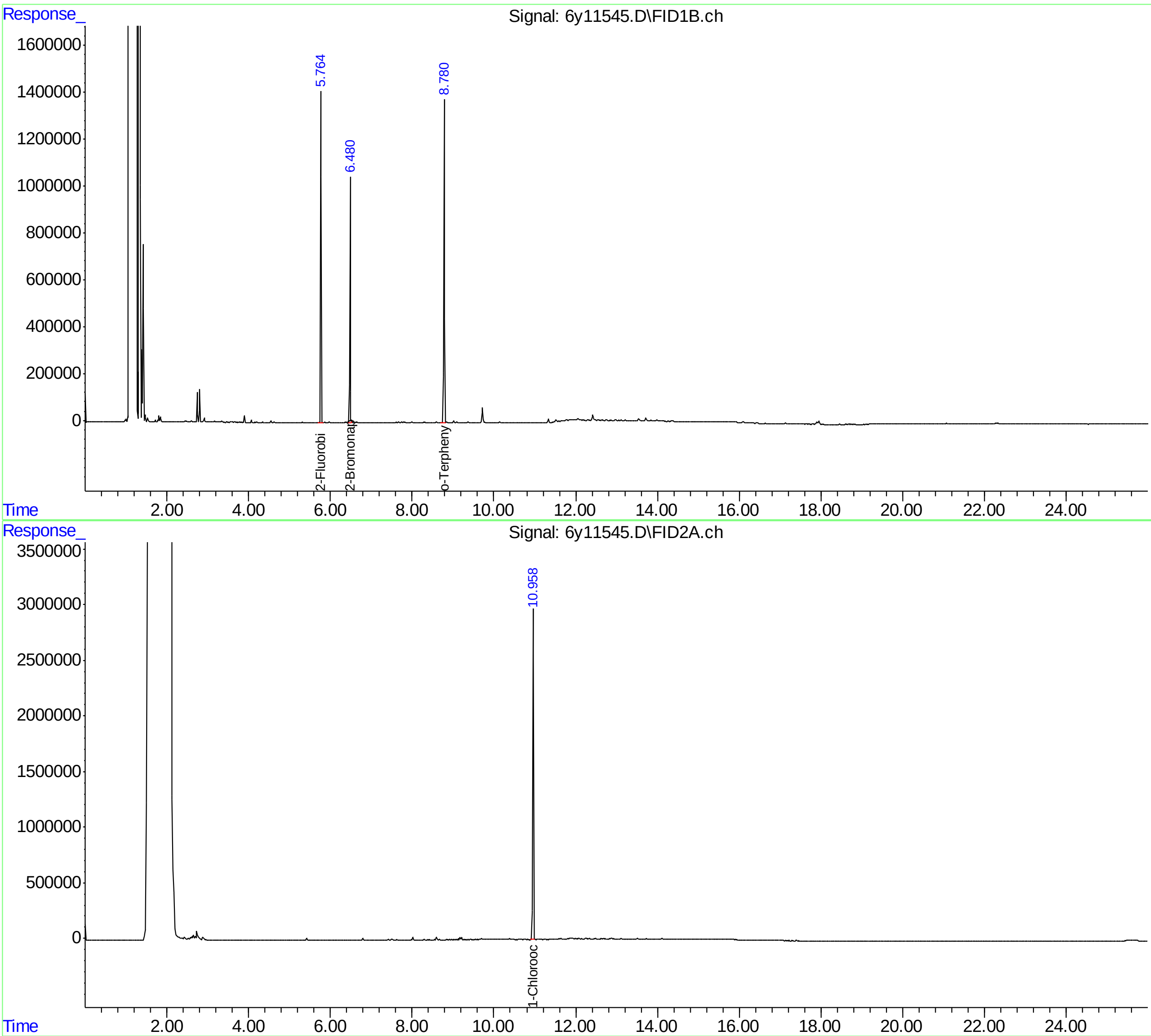
(f)=RT Delta > 1/2 Window   (m)=manual int.

Quantitation Report (QT Reviewed)

```
Data Path : C:\msdchem\1\DATA\6Y468\
Data File : 6y11545.D
Signal(s) : Signal #1: FID1B.ch  Signal #2: FID2A.ch
Acq On    :  5 Nov 2013   2:45 pm
Operator  : owenm
Sample    : op70366-mb1
Misc      : OP70366,G6y468,15.0,,,2,1
ALS Vial  : 4   Sample Multiplier: 1

Integration File signal 1: autoint1.e
Integration File signal 2: autoint2.e
Quant Time: Nov 06 08:48:54 2013
Quant Method : C:\MSDCHEM\1\METHODS\EPH6Y465.M
Quant Title  : NJDEP Extractable Petroleum Hydrocarbons
QLast Update : Mon Nov 04 09:20:51 2013
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj.      : 1ul/col
Signal #1 Phase : HP5             Signal #2 Phase: HP5
Signal #1 Info  : 30mx.25mm.x.25um  Signal #2 Info : 30mx.32mm.x25um
```



New Jersey
ACCUTEST
LABORATORIES

General Chemistry

QC Data Summaries

Includes the following where applicable:

- Percent Solids Raw Data Summary

Percent Solids Raw Data Summary

Job Number: JB51845
Account: ENVNJB EnviroTrac
Project: Aeriation Basin (Pool), 750 Cliff Road, Port Reading, NJ

Sample: JB51845-1 **Analyzed:** 02-NOV-13 by AR **Method:** SM2540 G-97
ClientID: SW-2

Wet Weight (Total)	30.21	g
Tare Weight	24.16	g
Dry Weight (Total)	28.66	g
Solids, Percent	74.4	%

Sample: JB51845-2 **Analyzed:** 02-NOV-13 by AR **Method:** SM2540 G-97
ClientID: NW-2

Wet Weight (Total)	32.41	g
Tare Weight	23.66	g
Dry Weight (Total)	30.31	g
Solids, Percent	76	%

New Jersey

ACCUTEST

LABORATORIES

Misc. Forms

Custody Documents and Other Forms

(Accutest Labs of New England, Inc.)

Includes the following where applicable:

- Chain of Custody
- Sample Tracking Chronicle

ACCUTEST LABORATORIES

CHAIN OF CUSTODY

NE

2235 Route 130, Dayton, NJ 08810
TEL. 732-329-0200 FAX: 732-329-3499/3480
www.accutest.com

FED-EX Tracking #	Bottle Order Control #
Accutest Quote #	Accutest Job # JB51845

Client / Reporting Information

- Company Name: Accutest Laboratories
- Street Address: 2235 Route 130
- City: Dayton State: NJ Zip: 08810
- Project Contact: michelle E-mail: michelle@accutest.com
- Phone #: 732-329-0200 Fax #:
- Sampler(s) Name(s): SD Phone:

Project Information

- Project Name: Aeriation Basin (Pool), 750 Cliff Road, Port Reading, NJ
- Street:
- City: State:
- Project #:
- Client Purchase Order #:
- Project Manager:

Billing Information (if different from Report to)

- Company Name:
- Street Address:
- City: State: Zip:
- Attention:

Requested Analysis (see TEST CODE sheet)

Matrix Codes: DW - Drinking Water, GW - Ground Water, WW - Water, SW - Surface Water, SO - Soil, SL- Sludge, SED-Sediment, OI - Oil, LIQ - Other Liquid, AIR - Air, SOL - Other Solid, WP - Wipe, FB-Field Blank, EB-Equipment Blank, RB- Rinse Blank, TB-Trip Blank

Accutest Sample #	Field ID / Point of Collection	MEOH/DI Vial #	Collection Date	Collection Time	Sampled by	Matrix	# of bottles	HCl	NaOH	HNO3	H2SO4	NONE	DI Water	MEOH	ENCORE	CR	LAB USE ONLY
1	SW-2		11/1/13	9:15:00 AM	SD	SO	1					1				X	
2	NW-2		11/1/13	9:25:00 AM	SD	SO	1					1				X	
																	15C,

Turnaround Time (Business days)

- [ ] Std. 10 Business Days
- [ ] 5 Day RUSH
- [ ] 3 Day EMERGENCY
- [ ] 2 Day EMERGENCY
- [ ] 1 Day EMERGENCY
- [X] other Due 11/7/2013

Emergency & Rush T/A data available VIA Lablink

Approved By (Accutest PM): / Date:

RUSH!

Data Deliverable Information

- [ ] Commercial "A" (Level 1)
- [ ] Commercial "B" (Level 2)
- [ ] FULLT1 (Level 3+4)
- [ ] NJ Reduced
- [ ] Commercial "C"
- [ ] NYASP Category A
- [ ] NYASP Category B
- [ ] State Forms
- [ ] EDD Format
- [X] Other REDT2

Commercial "A" = Results Only
Commercial "B" = Results + QC Summary
NJ Reduced = Results + QC Summary + Partial Raw data

Comments / Special Instructions

Results due 11/7. Please send 4oz N/P Bottle in SUB Location

Sample Custody must be documented below each time samples change possession, including courier delivery.

Relinquished by	Date Time	Received By	Relinquished By	Date Time	Received By
1 (Sampler)	11-5-13 1700	1 FEDEX	2	11-6-13 930	2
3 (Sampler)		3	4		4
5		5	Custody Seal # 270	☐ Intact ☐ Not intact	Preserved where applicable ☐ On Ice Cooler Temp. 1.9°C

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JB51845: Chain of Custody
Page 1 of 2
Accutest Labs of New England, Inc.

Accutest Laboratories Sample Receipt Summary

Accutest Job Number: JB51845 **Client:** ACNJ **Immediate Client Services Action Required:** No

Date / Time Received: 11/6/2013 **Delivery Method:** **Client Service Action Required at Login:** No

Project: SUB **No. Coolers:** 1 **Airbill #'s:**

Cooler Security	Y	N		Y	N
1. Custody Seals Present:	☑	☐	3. COC Present:	☑	☐
2. Custody Seals Intact:	☑	☐	4. Smpl Dates/Time OK	☑	☐

Cooler Temperature	Y	N
1. Temp criteria achieved:	☑	☐
2. Cooler temp verification:	Infared gun	
3. Cooler media:	Ice (bag)	

Quality Control_Preservation	Y	N	N/A
1. Trip Blank present / cooler:	☐	☐	☑
2. Trip Blank listed on COC:	☐	☐	☑
3. Samples preserved properly:	☑	☐	
4. VOCs headspace free:	☐	☐	☑

Sample Integrity - Documentation	Y	N
1. Sample labels present on bottles:	☑	☐
2. Container labeling complete:	☑	☐
3. Sample container label / COC agree:	☑	☐

Sample Integrity - Condition	Y	N
1. Sample recvd within HT:	☑	☐
2. All containers accounted for:	☑	☐
3. Condition of sample:	Intact	

Sample Integrity - Instructions	Y	N	N/A
1. Analysis requested is clear:	☑	☐	
2. Bottles received for unspecified tests	☐	☑	
3. Sufficient volume recvd for analysis:	☑	☐	
4. Compositing instructions clear:	☐	☐	☑
5. Filtering instructions clear:	☐	☐	☑

Comments

Accutest Laboratories
V:508.481.6200
495 Technology Center West, Bldg One
F: 508.481.7753
Marlborough, MA
www/accutest.com

9.1
9

JB51845: Chain of Custody
Page 2 of 2

Internal Sample Tracking Chronicle

Accutest New Jersey

Job No: JB51845

ENVNJB: Pool, 750 Cliff Road, Port Reading, NJ
Project No: Aeriation Basins

Sample Number	Method	Analyzed	By	Prepped	By	Test Codes
JB51845-1 SW-2	Collected: 01-NOV-13 09:15 By: SD		Received: 01-NOV-13 By: AF			
JB51845-1	SW846 6010C	07-NOV-13 00:11	EAL	06-NOV-13	EM	CR
JB51845-2 NW-2	Collected: 01-NOV-13 09:25 By: SD		Received: 01-NOV-13 By: AF			
JB51845-2	SW846 6010C	07-NOV-13 00:16	EAL	06-NOV-13	EM	CR

New Jersey
ACCUTEST
LABORATORIES

Metals Analysis

QC Data Summaries

(Accutest Labs of New England, Inc.)

Includes the following where applicable:

- Instrument Runlogs
- Initial and Continuing Calibration Blanks
- Initial and Continuing Calibration Checks
- High and Low Check Standards
- Interfering Element Check Standards
- Method Blank Summaries
- Matrix Spike and Duplicate Summaries
- Blank Spike and Lab Control Sample Summaries
- Serial Dilution Summaries

Accutest Laboratories Instrument Runlog
Inorganics Analyses

Login Number: JB51845
Account: ALNJ - Accutest New Jersey
Project: ENVNJB: Pool, 750 Cliff Road, Port Reading, NJ

File ID: SA110613M2.ICP   Date Analyzed: 11/06/13   Methods: SW846 6010C
Analyst: EAL   Run ID: MA16354
Parameters: Cr

Time	Sample Description	Dilution Factor	PS Recov	Comments
15:17	MA16354-STD1	1		STD1
15:22	MA16354-STD2	1		STD2
15:27	MA16354-STD3	1		STD3
15:32	MA16354-STD4	1		STD4
15:36	MA16354-ICV1	1		
15:41	ZZZZZZ	1		DNR: SEE RERUN FOR ICB.
15:48	MA16354-ICB1	1		
15:52	MA16354-CCV1	1		
15:58	MA16354-CCB1	1		
16:09	MA16354-CRI1	1		
16:13	MA16354-ICSA1	1		
16:18	MA16354-ICSAB1	1		
16:23	MP21965-B1	1		
16:28	MP21965-MB1	1		
16:33	MP21965-S1	1		NA OVER RANGE.
16:38	MP21965-S2	1		NA OVER RANGE.
16:43	JB51376-4F	1		(sample used for QC only; not part of login JB51845)
16:48	MP21965-SD1	5		
16:53	MP21965-B2	1		
16:57	MA16354-CCV2	1		
17:02	MA16354-CCB2	1		
17:07	ZZZZZZ	1		
17:12	ZZZZZZ	1		
17:17	ZZZZZZ	1		
17:22	ZZZZZZ	1		
17:27	ZZZZZZ	1		
17:32	ZZZZZZ	1		
17:37	ZZZZZZ	1		
17:42	ZZZZZZ	1		
17:46	ZZZZZZ	1		
17:51	ZZZZZZ	1		
17:56	MA16354-CCV3	1		
18:01	MA16354-CCB3	1		

Accutest Laboratories Instrument Runlog
Inorganics Analyses

Login Number: JB51845
Account: ALNJ - Accutest New Jersey
Project: ENVNJB: Pool, 750 Cliff Road, Port Reading, NJ

File ID: SA110613M2.ICP   Date Analyzed: 11/06/13   Methods: SW846 6010C
Analyst: EAL   Run ID: MA16354
Parameters: Cr

Time	Sample Description	Dilution Factor	PS Recov	Comments
18:06	ZZZZZZ	1		
18:11	ZZZZZZ	1		
18:16	ZZZZZZ	1		
18:21	ZZZZZZ	1		
18:26	ZZZZZZ	1		
18:31	ZZZZZZ	1		
18:36	ZZZZZZ	1		
18:41	ZZZZZZ	1		
18:46	ZZZZZZ	1		
18:50	MP21966-B1	1		
18:55	MA16354-CCV4	1		
19:00	MA16354-CCB4	1		
19:05	MP21966-MB1	1		
19:10	MP21966-S1	1		
19:15	MP21966-S2	1		
19:19	MC25819-6	1		(sample used for QC only; not part of login JB51845)
19:24	MP21966-SD1	5		
19:29	ZZZZZZ	1		
19:34	ZZZZZZ	1		
19:39	ZZZZZZ	1		
19:44	ZZZZZZ	1		
19:49	ZZZZZZ	1		
19:54	MA16354-CCV5	1		
19:59	MA16354-CCB5	1		
20:04	ZZZZZZ	1		
20:09	ZZZZZZ	1		
20:14	ZZZZZZ	1		
20:18	ZZZZZZ	1		
20:23	ZZZZZZ	1		
20:28	ZZZZZZ	1		
20:33	ZZZZZZ	1		
20:38	ZZZZZZ	1		
20:43	ZZZZZZ	1		

Accutest Laboratories Instrument Runlog
Inorganics Analyses

Login Number: JB51845
Account: ALNJ - Accutest New Jersey
Project: ENVNJB: Pool, 750 Cliff Road, Port Reading, NJ

File ID: SA110613M2.ICP   Date Analyzed: 11/06/13   Methods: SW846 6010C
Analyst: EAL   Run ID: MA16354
Parameters: Cr

Time	Sample Description	Dilution Factor	PS Recov	Comments
20:48	ZZZZZZ	1		
20:53	MA16354-CCV6	1		
20:58	MA16354-CCB6	1		
21:03	ZZZZZZ	1		
21:08	ZZZZZZ	1		
21:13	ZZZZZZ	1		
21:18	ZZZZZZ	1		RINSECONF
21:23	MA16354-CRI2	1		
21:27	MA16354-ICSA2	1		
21:32	MA16354-ICSAB2	1		
21:37	MA16354-CCV7	1		
21:42	MA16354-CCB7	1		
21:47	MA16354-CRIA1	1		
21:52	ZZZZZZ	1		
21:56	ZZZZZZ	3		
22:01	MP21988-B1	1		
22:06	MP21988-MB1	1		
22:11	MP21988-S1	1		
22:16	MP21988-S2	1		
22:20	MC25944-1	1		(sample used for QC only; not part of login JB51845)
22:25	MP21988-SD1	5		
22:30	MP21988-B2	1		
22:35	MA16354-CCV8	1		
22:40	MA16354-CCB8	1		
22:45	MP21988-LC1	1		
22:49	MP21988-S3	1		
22:54	MP21988-S4	1		
22:59	MC24967-1T	1		(sample used for QC only; not part of login JB51845)
23:04	ZZZZZZ	1		
23:09	ZZZZZZ	1		
23:13	ZZZZZZ	1		
23:18	ZZZZZZ	1		
23:23	ZZZZZZ	1		

Accutest Laboratories Instrument Runlog
Inorganics Analyses

Login Number: JB51845
Account: ALNJ - Accutest New Jersey
Project: ENVNJB: Pool, 750 Cliff Road, Port Reading, NJ

File ID: SA110613M2.ICP Date Analyzed: 11/06/13 Methods: SW846 6010C
Analyst: EAL Run ID: MA16354
Parameters: Cr

Time	Sample Description	Dilution Factor	PS Recov	Comments
23:28	ZZZZZZ	1		
23:33	MA16354-CCV9	1		
23:37	MA16354-CCB9	1		
23:42	ZZZZZZ	1		
23:47	ZZZZZZ	1		
23:52	ZZZZZZ	1		
23:57	ZZZZZZ	1		
00:02	ZZZZZZ	1		
00:07	ZZZZZZ	1		
00:11	JB51845-1	1		
00:16	JB51845-2	1		
-----------> Last reportable sample/prep for job JB51845				
00:21	ZZZZZZ	1		
00:26	ZZZZZZ	1		
00:31	MA16354-CCV10	1		
00:36	MA16354-CCB10	1		
00:41	ZZZZZZ	1		
00:45	ZZZZZZ	1		
00:50	ZZZZZZ	1		RINSECONF
00:55	MA16354-CRIA2	1		
01:00	MA16354-CRIB1	1		SB OUT.
01:05	MP21977-B1	1		
01:10	MP21977-MB1	1		
01:15	MP21977-S1	1		
01:20	MP21977-S2	1		
01:25	MC25715-1	1		(sample used for QC only; not part of login JB51845)
01:30	MA16354-CCV11	1		
01:34	MA16354-CCB11	1		
01:39	MP21977-SD1	5		
01:44	MP21977-B2	1		
01:49	MP21977-LB1	1		
01:54	MP21977-LS1	1		
01:59	ZZZZZZ	1		
02:04	ZZZZZZ	1		

Accutest Laboratories Instrument Runlog
Inorganics Analyses

Login Number: JB51845
Account: ALNJ - Accutest New Jersey
Project: ENVNJB: Pool, 750 Cliff Road, Port Reading, NJ

File ID: SA110613M2.ICP   Date Analyzed: 11/06/13   Methods: SW846 6010C
Analyst: EAL   Run ID: MA16354
Parameters: Cr

Time	Sample Description	Dilution Factor	PS Recov	Comments
02:09	ZZZZZZ	1		
02:14	ZZZZZZ	1		
02:19	ZZZZZZ	1		
02:25	ZZZZZZ	1		
02:29	MA16354-CCV12	1		NA OUT.
02:34	MA16354-CCB12	1		
02:39	MA16354-CRIB2	1		SB OUT.
02:44	MA16354-ICSA3	1		
02:49	MA16354-ICSAB3	1		
02:54	MA16354-CCV13	1		
02:59	MA16354-CCB13	1		

-----------> Last reportable CCB for job JB51845
Refer to raw data for calibration curve and standards.

INTERNAL STANDARD SUMMARY

Login Number: JB51845
Account: ALNJ - Accutest New Jersey
Project: ENVNJB: Pool, 750 Cliff Road, Port Reading, NJ

File ID: SA110613M2.ICP   Date Analyzed: 11/06/13   Methods: SW846 6010C
Analyst: EAL   Run ID: MA16354
Parameters: Cr

Time	Sample Description	Istd#1	Istd#2	Istd#3
15:17	MA16354-STD1	4746 R	122140 R	9764 R
15:22	MA16354-STD2	4692	122260	9446
15:27	MA16354-STD3			9384
15:32	MA16354-STD4	4793	122750	9739
15:36	MA16354-ICV1	4727	123070	9437
15:41	ZZZZZZ	4724	122410	9399
15:48	MA16354-ICB1	4718	122210	9406
15:52	MA16354-CCV1	4769	122580	9383
15:58	MA16354-CCB1	4648	125580	9425
16:09	MA16354-CRI1	4685	122770	9435
16:13	MA16354-ICSA1	4340	115340	9182
16:18	MA16354-ICSAB1	4326	114480	8926
16:23	MP21965-B1	4612	122280	9502
16:28	MP21965-MB1	4619	123490	9508
16:33	MP21965-S1	4172	113630	9322
16:38	MP21965-S2	4210	113630	9168
16:43	JB51376-4F	4198	113360	9261
16:48	MP21965-SD1	4541	120540	9438
16:53	MP21965-B2	4582	122380	9408
16:57	MA16354-CCV2	4666	124740	9426
17:02	MA16354-CCB2	4666	123580	9478
17:07	ZZZZZZ	4605	122840	9565
17:12	ZZZZZZ	4498	121180	9454
17:17	ZZZZZZ	4630	124190	9666
17:22	ZZZZZZ	4581	125870	9667
17:27	ZZZZZZ	4569	123010	9489
17:32	ZZZZZZ	4350	117950	9534
17:37	ZZZZZZ	4640	125760	9469
17:42	ZZZZZZ	4440	120550	9488
17:46	ZZZZZZ	4606	124500	9699
17:51	ZZZZZZ	4499	120890	9456
17:56	MA16354-CCV3	4638	124980	9526
18:01	MA16354-CCB3	4630	124030	9469

INTERNAL STANDARD SUMMARY

Login Number: JB51845
Account: ALNJ - Accutest New Jersey
Project: ENVNJB: Pool, 750 Cliff Road, Port Reading, NJ

File ID: SA110613M2.ICP   Date Analyzed: 11/06/13   Methods: SW846 6010C
Analyst: EAL   Run ID: MA16354
Parameters: Cr

Time	Sample Description	Istd#1	Istd#2	Istd#3
18:06	ZZZZZZ	4397	118320	9493
18:11	ZZZZZZ	4278	116310	9483
18:16	ZZZZZZ	4382	118650	9432
18:21	ZZZZZZ	4332	115810	9143
18:26	ZZZZZZ	4430	120720	9406
18:31	ZZZZZZ	4607	123680	9538
18:36	ZZZZZZ	4597	123880	9612
18:41	ZZZZZZ	4674	124680	9729
18:46	ZZZZZZ	4601	127450	9512
18:50	MP21966-B1	4552	123330	9473
18:55	MA16354-CCV4	4628	125070	9432
19:00	MA16354-CCB4	4590	124310	9457
19:05	MP21966-MB1	4539	123290	9491
19:10	MP21966-S1	4498	122080	9434
19:15	MP21966-S2	4476	123040	9555
19:19	MC25819-6	4545	123620	9679
19:24	MP21966-SD1	4603	124190	9489
19:29	ZZZZZZ	4518	123910	9519
19:34	ZZZZZZ	4494	123430	9542
19:39	ZZZZZZ	4538	122860	9474
19:44	ZZZZZZ	4551	124040	9460
19:49	ZZZZZZ	4504	123030	9579
19:54	MA16354-CCV5	4572	123920	9434
19:59	MA16354-CCB5	4585	123350	9432
20:04	ZZZZZZ	4526	123660	9497
20:09	ZZZZZZ	4504	121980	9431
20:14	ZZZZZZ	4548	123170	9443
20:18	ZZZZZZ	4543	124680	9094
20:23	ZZZZZZ	4468	122460	9410
20:28	ZZZZZZ	4510	124690	9649
20:33	ZZZZZZ	4508	123930	9609
20:38	ZZZZZZ	4482	123440	9567
20:43	ZZZZZZ	4480	123840	9535

INTERNAL STANDARD SUMMARY

Login Number: JB51845
Account: ALNJ - Accutest New Jersey
Project: ENVNJB: Pool, 750 Cliff Road, Port Reading, NJ

File ID: SA110613M2.ICP   Date Analyzed: 11/06/13   Methods: SW846 6010C
Analyst: EAL   Run ID: MA16354
Parameters: Cr

Time	Sample Description	Istd#1	Istd#2	Istd#3
20:48	ZZZZZZ	4521	122660	9510
20:53	MA16354-CCV6	4559	124640	9510
20:58	MA16354-CCB6	4524	124140	9452
21:03	ZZZZZZ	4513	123870	9514
21:08	ZZZZZZ	4503	122860	9467
21:13	ZZZZZZ	4474	124150	9619
21:18	ZZZZZZ	4547	123820	9514
21:23	MA16354-CRI2	4525	127180	9475
21:27	MA16354-ICSA2	4190	116280	9116
21:32	MA16354-ICSAB2	4189	115780	9042
21:37	MA16354-CCV7	4543	125030	9408
21:42	MA16354-CCB7	4492	122940	9289
21:47	MA16354-CRIA1	4514	122140	9266
21:52	ZZZZZZ	5256	145780	11084
21:56	ZZZZZZ	5829	157720	11777
22:01	MP21988-B1	4424	121730	9233
22:06	MP21988-MB1	4427	122920	9373
22:11	MP21988-S1	4585	126870	9572
22:16	MP21988-S2	4619	127490	9648
22:20	MC25944-1	4710	129570	9781
22:25	MP21988-SD1	4613	125260	9434
22:30	MP21988-B2	4364	120850	9261
22:35	MA16354-CCV8	4480	124360	9394
22:40	MA16354-CCB8	4432	121280	9546
22:45	MP21988-LC1	4806	134540	10187
22:49	MP21988-S3	4237	118570	9359
22:54	MP21988-S4	4230	123900	9373
22:59	MC24967-1T	4318	121460	9428
23:04	ZZZZZZ	4899	137480	10531
23:09	ZZZZZZ	4803	135030	10350
23:13	ZZZZZZ	4760	136570	10629
23:18	ZZZZZZ	4705	132410	10153
23:23	ZZZZZZ	4913	138760	10438

INTERNAL STANDARD SUMMARY

Login Number: JB51845
Account: ALNJ - Accutest New Jersey
Project: ENVNJB: Pool, 750 Cliff Road, Port Reading, NJ

File ID: SA110613M2.ICP   Date Analyzed: 11/06/13   Methods: SW846 6010C
Analyst: EAL   Run ID: MA16354
Parameters: Cr

Time	Sample Description	Istd#1	Istd#2	Istd#3
23:28	ZZZZZZ	4648	130670	9934
23:33	MA16354-CCV9	4456	124780	9442
23:37	MA16354-CCB9	4437	121130	9400
23:42	ZZZZZZ	4754	133210	10172
23:47	ZZZZZZ	4588	130100	9748
23:52	ZZZZZZ	4709	131310	9889
23:57	ZZZZZZ	4705	131200	10340
00:02	ZZZZZZ	4620	130220	9922
00:07	ZZZZZZ	4662	133000	10075
00:11	JB51845-1	4801	133700	10125
00:16	JB51845-2	4604	126940	9739
00:21	ZZZZZZ	4795	135130	10236
00:26	ZZZZZZ	5046	142560	10855
00:31	MA16354-CCV10	4448	125620	9475
00:36	MA16354-CCB10	4406	123980	9413
00:41	ZZZZZZ	4510	125490	9941
00:45	ZZZZZZ	4543	127320	9632
00:50	ZZZZZZ	4409	122020	9231
00:55	MA16354-CRIA2	4388	123690	9292
01:00	MA16354-CRIB1	4378	122470	9319
01:05	MP21977-B1	4054	112980	9329
01:10	MP21977-MB1	4355	121820	9330
01:15	MP21977-S1	4182	117340	9279
01:20	MP21977-S2	4172	117750	9297
01:25	MC25715-1	4143	117420	9294
01:30	MA16354-CCV11	4372	123170	9295
01:34	MA16354-CCB11	4307	118220	8921
01:39	MP21977-SD1	4244	118750	9248
01:44	MP21977-B2	3987	111870	9296
01:49	MP21977-LB1	3972	111760	9270
01:54	MP21977-LS1	4101	118380	9398
01:59	ZZZZZZ	4094	118910	9387
02:04	ZZZZZZ	3682	107120	9394

INTERNAL STANDARD SUMMARY

Login Number: JB51845
Account: ALNJ - Accutest New Jersey
Project: ENVNJB: Pool, 750 Cliff Road, Port Reading, NJ

File ID: SA110613M2.ICP   Date Analyzed: 11/06/13   Methods: SW846 6010C
Analyst: EAL   Run ID: MA16354
Parameters: Cr

Time	Sample Description	Istd#1	Istd#2	Istd#3
02:09	ZZZZZZ	3930	111450	9286
02:14	ZZZZZZ	3776	109650	9356
02:19	ZZZZZZ	3827	110480	9244
02:25	ZZZZZZ	3876	110610	9153
02:29	MA16354-CCV12	4331	124190	9194
02:34	MA16354-CCB12	4260	122310	9313
02:39	MA16354-CRIB2	4300	123500	9427
02:44	MA16354-ICSA3	3961	114780	8884
02:49	MA16354-ICSAB3	3961	115560	8987
02:54	MA16354-CCV13	4275	123230	9226
02:59	MA16354-CCB13	4267	122090	9205

R = Reference for ISTD limits.   ! = Outside limits.

LEGEND:

Istd#	Parameter	Limits
Istd#1	Yttrium (2243)	70-130 %
Istd#2	Yttrium (3600)	70-130 %
Istd#3	Yttrium (3710)	70-130 %

10.1.1

10

BLANK RESULTS SUMMARY
Part 1 - Initial and Continuing Calibration Blanks

Login Number: JB51845
Account: ALNJ - Accutest New Jersey
Project: ENVNJB: Pool, 750 Cliff Road, Port Reading, NJ

File ID: SA110613M2.ICP　　Date Analyzed: 11/06/13　　Methods: SW846 6010C
QC Limits: result < RL　　Run ID: MA16354　　Units: ug/l

Time:			15:48		15:58		17:02		18:01	
Sample ID:			ICB1		CCB1		CCB2		CCB3	
Metal	RL	IDL	raw	final	raw	final	raw	final	raw	final
Aluminum	200	22	anr							
Antimony	6.0	1.1	anr							
Arsenic	4.0	1.2	anr							
Barium	50	.53	anr							
Beryllium	4.0	.15	anr							
Boron	100	.49								
Cadmium	4.0	.04	anr							
Calcium	5000	7.4	anr							
Chromium	10	.38	0.0	<10	-0.10	<10	0.20	<10	0.10	<10
Cobalt	50	.15	anr							
Copper	25	.52	anr							
Gold	50	1.4								
Iron	100	5	anr							
Lead	5.0	.95	anr							
Magnesium	5000	47	anr							
Manganese	15	.04	anr							
Molybdenum	100	.29	anr							
Nickel	40	.25	anr							
Palladium	50	1.9								
Platinum	50	5.9								
Potassium	5000	56	anr							
Selenium	10	1.8	anr							
Silicon	100	1.3								
Silver	5.0	.56	anr							
Sodium	5000	33	anr							
Sulfur	50	3.4								
Strontium	10	.15								
Thallium	5.0	.98	anr							
Tin	100	.35	anr							
Titanium	50	.44	anr							
Tungsten	100	5.6								
Vanadium	10	.58	anr							
Zinc	20	.21	anr							

BLANK RESULTS SUMMARY
Part 1 - Initial and Continuing Calibration Blanks

Login Number: JB51845
Account: ALNJ - Accutest New Jersey
Project: ENVNJB: Pool, 750 Cliff Road, Port Reading, NJ

File ID: SA110613M2.ICP   Date Analyzed: 11/06/13   Methods: SW846 6010C
QC Limits: result < RL   Run ID: MA16354   Units: ug/l

Time: / Sample ID:			15:48 ICB1		15:58 CCB1		17:02 CCB2		18:01 CCB3	
Metal	RL	IDL	raw	final	raw	final	raw	final	raw	final
Zirconium	50	1.8								

(*) Outside of QC limits
(anr) Analyte not requested

BLANK RESULTS SUMMARY
Part 1 - Initial and Continuing Calibration Blanks

Login Number: JB51845
Account: ALNJ - Accutest New Jersey
Project: ENVNJB: Pool, 750 Cliff Road, Port Reading, NJ

File ID: SA110613M2.ICP Date Analyzed: 11/06/13 Methods: SW846 6010C
QC Limits: result < RL Run ID: MA16354 Units: ug/l

Time:			19:00		19:59		20:58		21:42	
Sample ID:			CCB4		CCB5		CCB6		CCB7	
Metal	RL	IDL	raw	final	raw	final	raw	final	raw	final
Aluminum	200	22	anr							
Antimony	6.0	1.1	anr							
Arsenic	4.0	1.2	anr							
Barium	50	.53	anr							
Beryllium	4.0	.15	anr							
Boron	100	.49								
Cadmium	4.0	.04	anr							
Calcium	5000	7.4	anr							
Chromium	10	.38	0.30	<10	-0.10	<10	-0.10	<10	0.20	<10
Cobalt	50	.15	anr							
Copper	25	.52	anr							
Gold	50	1.4								
Iron	100	5	anr							
Lead	5.0	.95	anr							
Magnesium	5000	47	anr							
Manganese	15	.04	anr							
Molybdenum	100	.29	anr							
Nickel	40	.25	anr							
Palladium	50	1.9								
Platinum	50	5.9								
Potassium	5000	56	anr							
Selenium	10	1.8	anr							
Silicon	100	1.3								
Silver	5.0	.56	anr							
Sodium	5000	33	anr							
Sulfur	50	3.4								
Strontium	10	.15								
Thallium	5.0	.98	anr							
Tin	100	.35	anr							
Titanium	50	.44	anr							
Tungsten	100	5.6								
Vanadium	10	.58	anr							
Zinc	20	.21	anr							

BLANK RESULTS SUMMARY
Part 1 - Initial and Continuing Calibration Blanks

Login Number: JB51845
Account: ALNJ - Accutest New Jersey
Project: ENVNJB: Pool, 750 Cliff Road, Port Reading, NJ

File ID: SA110613M2.ICP　　Date Analyzed: 11/06/13　　Methods: SW846 6010C
QC Limits: result < RL　　Run ID: MA16354　　Units: ug/l

Time:			19:00		19:59		20:58		21:42	
Sample ID:			CCB4		CCB5		CCB6		CCB7	
Metal	RL	IDL	raw	final	raw	final	raw	final	raw	final
Zirconium	50	1.8								

(*) Outside of QC limits
(anr) Analyte not requested

BLANK RESULTS SUMMARY
Part 1 - Initial and Continuing Calibration Blanks

Login Number: JB51845
Account: ALNJ - Accutest New Jersey
Project: ENVNJB: Pool, 750 Cliff Road, Port Reading, NJ

File ID: SA110613M2.ICP Date Analyzed: 11/06/13 Methods: SW846 6010C
QC Limits: result < RL Run ID: MA16354 Units: ug/l

Time:			22:40		23:37		00:36		01:34	
Sample ID:			CCB8		CCB9		CCB10		CCB11	
Metal	RL	IDL	raw	final	raw	final	raw	final	raw	final
Aluminum	200	22	anr							
Antimony	6.0	1.1	anr							
Arsenic	4.0	1.2	anr							
Barium	50	.53	anr							
Beryllium	4.0	.15	anr							
Boron	100	.49								
Cadmium	4.0	.04	anr							
Calcium	5000	7.4	anr							
Chromium	10	.38	0.40	<10	-0.10	<10	-0.30	<10	0.0	<10
Cobalt	50	.15	anr							
Copper	25	.52	anr							
Gold	50	1.4								
Iron	100	5	anr							
Lead	5.0	.95	anr							
Magnesium	5000	47	anr							
Manganese	15	.04	anr							
Molybdenum	100	.29	anr							
Nickel	40	.25	anr							
Palladium	50	1.9								
Platinum	50	5.9								
Potassium	5000	56	anr							
Selenium	10	1.8	anr							
Silicon	100	1.3								
Silver	5.0	.56	anr							
Sodium	5000	33	anr							
Sulfur	50	3.4								
Strontium	10	.15								
Thallium	5.0	.98	anr							
Tin	100	.35	anr							
Titanium	50	.44	anr							
Tungsten	100	5.6								
Vanadium	10	.58	anr							
Zinc	20	.21	anr							

BLANK RESULTS SUMMARY
Part 1 - Initial and Continuing Calibration Blanks

Login Number: JB51845
Account: ALNJ - Accutest New Jersey
Project: ENVNJB: Pool, 750 Cliff Road, Port Reading, NJ

File ID: SA110613M2.ICP　　Date Analyzed: 11/06/13　　Methods: SW846 6010C
QC Limits: result < RL　　Run ID: MA16354　　Units: ug/l

Time:			22:40		23:37		00:36		01:34	
Sample ID:			CCB8		CCB9		CCB10		CCB11	
Metal	RL	IDL	raw	final	raw	final	raw	final	raw	final
Zirconium	50	1.8								

(*) Outside of QC limits
(anr) Analyte not requested

BLANK RESULTS SUMMARY
Part 1 - Initial and Continuing Calibration Blanks

Login Number: JB51845
Account: ALNJ - Accutest New Jersey
Project: ENVNJB: Pool, 750 Cliff Road, Port Reading, NJ

File ID: SA110613M2.ICP   Date Analyzed: 11/06/13   Methods: SW846 6010C
QC Limits: result < RL   Run ID: MA16354   Units: ug/l

Time: / Sample ID: / Metal	RL	IDL	02:34 CCB12 raw	final	02:59 CCB13 raw	final
Aluminum	200	22	anr			
Antimony	6.0	1.1	anr			
Arsenic	4.0	1.2	anr			
Barium	50	.53	anr			
Beryllium	4.0	.15	anr			
Boron	100	.49				
Cadmium	4.0	.04	anr			
Calcium	5000	7.4	anr			
Chromium	10	.38	0.0	<10	-0.10	<10
Cobalt	50	.15	anr			
Copper	25	.52	anr			
Gold	50	1.4				
Iron	100	5	anr			
Lead	5.0	.95	anr			
Magnesium	5000	47	anr			
Manganese	15	.04	anr			
Molybdenum	100	.29	anr			
Nickel	40	.25	anr			
Palladium	50	1.9				
Platinum	50	5.9				
Potassium	5000	56	anr			
Selenium	10	1.8	anr			
Silicon	100	1.3				
Silver	5.0	.56	anr			
Sodium	5000	33	anr			
Sulfur	50	3.4				
Strontium	10	.15				
Thallium	5.0	.98	anr			
Tin	100	.35	anr			
Titanium	50	.44	anr			
Tungsten	100	5.6				
Vanadium	10	.58	anr			
Zinc	20	.21	anr			

BLANK RESULTS SUMMARY
Part 1 - Initial and Continuing Calibration Blanks

Login Number: JB51845
Account: ALNJ - Accutest New Jersey
Project: ENVNJB: Pool, 750 Cliff Road, Port Reading, NJ

File ID: SA110613M2.ICP   Date Analyzed: 11/06/13   Methods: SW846 6010C
QC Limits: result < RL   Run ID: MA16354   Units: ug/l

Time:			02:34		02:59	
Sample ID:			CCB12		CCB13	
Metal	RL	IDL	raw	final	raw	final
Zirconium	50	1.8				

(*) Outside of QC limits
(anr) Analyte not requested

CALIBRATION CHECK STANDARDS SUMMARY
Initial and Continuing Calibration Checks

Login Number: JB51845
Account: ALNJ - Accutest New Jersey
Project: ENVNJB: Pool, 750 Cliff Road, Port Reading, NJ

File ID: SA110613M2.ICP   Date Analyzed: 11/06/13   Methods: SW846 6010C
QC Limits: 90 to 110 % Recovery   Run ID: MA16354   Units: ug/l

Time: Sample ID: Metal	ICV True	15:36 ICV1 Results	% Rec	CCV True	15:52 CCV1 Results	% Rec	CCV True	16:57 CCV2 Results	% Rec
Aluminum	anr								
Antimony	anr								
Arsenic	anr								
Barium	anr								
Beryllium	anr								
Boron									
Cadmium	anr								
Calcium	anr								
Chromium	3000	2990	99.7	2000	1970	98.5	2000	1960	98.0
Cobalt	anr								
Copper	anr								
Gold									
Iron	anr								
Lead	anr								
Magnesium	anr								
Manganese	anr								
Molybdenum	anr								
Nickel	anr								
Palladium									
Platinum									
Potassium	anr								
Selenium	anr								
Silicon									
Silver	anr								
Sodium	anr								
Sulfur									
Strontium									
Thallium	anr								
Tin	anr								
Titanium	anr								
Tungsten									
Vanadium	anr								
Zinc	anr								

CALIBRATION CHECK STANDARDS SUMMARY
Initial and Continuing Calibration Checks

Login Number: JB51845
Account: ALNJ - Accutest New Jersey
Project: ENVNJB: Pool, 750 Cliff Road, Port Reading, NJ

File ID: SA110613M2.ICP   Date Analyzed: 11/06/13   Methods: SW846 6010C
QC Limits: 90 to 110 % Recovery   Run ID: MA16354   Units: ug/l

Time:		15:36			15:52			16:57	
Sample ID:	ICV	ICV1		CCV	CCV1		CCV	CCV2	
Metal	True	Results	% Rec	True	Results	% Rec	True	Results	% Rec
Zirconium									

(*) Outside of QC limits
(anr) Analyte not requested

CALIBRATION CHECK STANDARDS SUMMARY
Initial and Continuing Calibration Checks

Login Number: JB51845
Account: ALNJ - Accutest New Jersey
Project: ENVNJB: Pool, 750 Cliff Road, Port Reading, NJ

File ID: SA110613M2.ICP Date Analyzed: 11/06/13 Methods: SW846 6010C
QC Limits: 90 to 110 % Recovery Run ID: MA16354 Units: ug/l

Time:		17:56			18:55			19:54	
Sample ID:	CCV	CCV3		CCV	CCV4		CCV	CCV5	
Metal	True	Results	% Rec	True	Results	% Rec	True	Results	% Rec
Aluminum	anr								
Antimony	anr								
Arsenic	anr								
Barium	anr								
Beryllium	anr								
Boron									
Cadmium	anr								
Calcium	anr								
Chromium	2000	1940	97.0	2000	1940	97.0	2000	1960	98.0
Cobalt	anr								
Copper	anr								
Gold									
Iron	anr								
Lead	anr								
Magnesium	anr								
Manganese	anr								
Molybdenum	anr								
Nickel	anr								
Palladium									
Platinum									
Potassium	anr								
Selenium	anr								
Silicon									
Silver	anr								
Sodium	anr								
Sulfur									
Strontium									
Thallium	anr								
Tin	anr								
Titanium	anr								
Tungsten									
Vanadium	anr								
Zinc	anr								

CALIBRATION CHECK STANDARDS SUMMARY
Initial and Continuing Calibration Checks

Login Number: JB51845
Account: ALNJ - Accutest New Jersey
Project: ENVNJB: Pool, 750 Cliff Road, Port Reading, NJ

File ID: SA110613M2.ICP   Date Analyzed: 11/06/13   Methods: SW846 6010C
QC Limits: 90 to 110 % Recovery   Run ID: MA16354   Units: ug/l

Time:		17:56			18:55			19:54	
Sample ID:	CCV	CCV3		CCV	CCV4		CCV	CCV5	
Metal	True	Results	% Rec	True	Results	% Rec	True	Results	% Rec
Zirconium									

(*) Outside of QC limits
(anr) Analyte not requested

CALIBRATION CHECK STANDARDS SUMMARY
Initial and Continuing Calibration Checks

Login Number: JB51845
Account: ALNJ - Accutest New Jersey
Project: ENVNJB: Pool, 750 Cliff Road, Port Reading, NJ

File ID: SA110613M2.ICP   Date Analyzed: 11/06/13   Methods: SW846 6010C
QC Limits: 90 to 110 % Recovery   Run ID: MA16354   Units: ug/l

Time:		20:53			21:37			22:35	
Sample ID:	CCV	CCV6		CCV	CCV7		CCV	CCV8	
Metal	True	Results	% Rec	True	Results	% Rec	True	Results	% Rec
Aluminum	anr								
Antimony	anr								
Arsenic	anr								
Barium	anr								
Beryllium	anr								
Boron									
Cadmium	anr								
Calcium	anr								
Chromium	2000	1960	98.0	2000	1960	98.0	2000	1960	98.0
Cobalt	anr								
Copper	anr								
Gold									
Iron	anr								
Lead	anr								
Magnesium	anr								
Manganese	anr								
Molybdenum	anr								
Nickel	anr								
Palladium									
Platinum									
Potassium	anr								
Selenium	anr								
Silicon									
Silver	anr								
Sodium	anr								
Sulfur									
Strontium									
Thallium	anr								
Tin	anr								
Titanium	anr								
Tungsten									
Vanadium	anr								
Zinc	anr								

CALIBRATION CHECK STANDARDS SUMMARY
Initial and Continuing Calibration Checks

Login Number: JB51845
Account: ALNJ - Accutest New Jersey
Project: ENVNJB: Pool, 750 Cliff Road, Port Reading, NJ

File ID: SA110613M2.ICP　Date Analyzed: 11/06/13　Methods: SW846 6010C
QC Limits: 90 to 110 % Recovery　Run ID: MA16354　Units: ug/l

Time:		20:53			21:37			22:35	
Sample ID:	CCV	CCV6		CCV	CCV7		CCV	CCV8	
Metal	True	Results	% Rec	True	Results	% Rec	True	Results	% Rec
Zirconium									

(*) Outside of QC limits
(anr) Analyte not requested

CALIBRATION CHECK STANDARDS SUMMARY
Initial and Continuing Calibration Checks

Login Number: JB51845
Account: ALNJ - Accutest New Jersey
Project: ENVNJB: Pool, 750 Cliff Road, Port Reading, NJ

File ID: SA110613M2.ICP Date Analyzed: 11/06/13 Methods: SW846 6010C
QC Limits: 90 to 110 % Recovery Run ID: MA16354 Units: ug/l

Time:		23:33			00:31			01:30	
Sample ID:	CCV	CCV9		CCV	CCV10		CCV	CCV11	
Metal	True	Results	% Rec	True	Results	% Rec	True	Results	% Rec
Aluminum	anr								
Antimony	anr								
Arsenic	anr								
Barium	anr								
Beryllium	anr								
Boron									
Cadmium	anr								
Calcium	anr								
Chromium	2000	1970	98.5	2000	1950	97.5	2000	2000	100.0
Cobalt	anr								
Copper	anr								
Gold									
Iron	anr								
Lead	anr								
Magnesium	anr								
Manganese	anr								
Molybdenum	anr								
Nickel	anr								
Palladium									
Platinum									
Potassium	anr								
Selenium	anr								
Silicon									
Silver	anr								
Sodium	anr								
Sulfur									
Strontium									
Thallium	anr								
Tin	anr								
Titanium	anr								
Tungsten									
Vanadium	anr								
Zinc	anr								

CALIBRATION CHECK STANDARDS SUMMARY
Initial and Continuing Calibration Checks

Login Number: JB51845
Account: ALNJ - Accutest New Jersey
Project: ENVNJB: Pool, 750 Cliff Road, Port Reading, NJ

File ID: SA110613M2.ICP | Date Analyzed: 11/06/13 | Methods: SW846 6010C
QC Limits: 90 to 110 % Recovery | Run ID: MA16354 | Units: ug/l

Time:		23:33			00:31			01:30	
Sample ID:	CCV	CCV9		CCV	CCV10		CCV	CCV11	
Metal	True	Results	% Rec	True	Results	% Rec	True	Results	% Rec
Zirconium									

(*) Outside of QC limits
(anr) Analyte not requested

CALIBRATION CHECK STANDARDS SUMMARY
Initial and Continuing Calibration Checks

Login Number: JB51845
Account: ALNJ - Accutest New Jersey
Project: ENVNJB: Pool, 750 Cliff Road, Port Reading, NJ

File ID: SA110613M2.ICP Date Analyzed: 11/06/13 Methods: SW846 6010C
QC Limits: 90 to 110 % Recovery Run ID: MA16354 Units: ug/l

Time: / Sample ID: / Metal	CCV True	02:29 CCV12 Results	% Rec	CCV True	02:54 CCV13 Results	% Rec
Aluminum	anr					
Antimony	anr					
Arsenic	anr					
Barium	anr					
Beryllium	anr					
Boron						
Cadmium	anr					
Calcium	anr					
Chromium	2000	1980	99.0	2000	2010	100.5
Cobalt	anr					
Copper	anr					
Gold						
Iron	anr					
Lead	anr					
Magnesium	anr					
Manganese	anr					
Molybdenum	anr					
Nickel	anr					
Palladium						
Platinum						
Potassium	anr					
Selenium	anr					
Silicon						
Silver	anr					
Sodium	anr					
Sulfur						
Strontium						
Thallium	anr					
Tin	anr					
Titanium	anr					
Tungsten						
Vanadium	anr					
Zinc	anr					

CALIBRATION CHECK STANDARDS SUMMARY
Initial and Continuing Calibration Checks

Login Number: JB51845
Account: ALNJ - Accutest New Jersey
Project: ENVNJB: Pool, 750 Cliff Road, Port Reading, NJ

File ID: SA110613M2.ICP Date Analyzed: 11/06/13 Methods: SW846 6010C
QC Limits: 90 to 110 % Recovery Run ID: MA16354 Units: ug/l

Time:		02:29			02:54	
Sample ID:	CCV	CCV12		CCV	CCV13	
Metal	True	Results	% Rec	True	Results	% Rec
Zirconium						

(*) Outside of QC limits
(anr) Analyte not requested

LOW CALIBRATION CHECK STANDARDS SUMMARY

Login Number: JB51845
Account: ALNJ - Accutest New Jersey
Project: ENVNJB: Pool, 750 Cliff Road, Port Reading, NJ

File ID: SA110613M2.ICP   Date Analyzed: 11/06/13   Methods: SW846 6010C
QC Limits: CRI 70-130% CRIA 70-130%   Run ID: MA16354   Units: ug/l

Time:			16:09		21:23		21:47		00:55	
Sample ID:	CRI	CRIA	CRI1		CRI2		CRIA1		CRIA2	
Metal	True	True	Results	% Rec	Results	% Rec	Results	% Rec	Results	% Rec
Aluminum	200	200	anr							
Antimony	6.0	10	anr							
Arsenic	4.0	10	anr							
Barium	50	50	anr							
Beryllium	4.0	4.0	anr							
Boron	100	100								
Cadmium	4.0	4.0	anr							
Calcium	5000	5000	anr							
Chromium	10	10	10.1	101.0	10.1	101.0	10.2	102.0	10.4	104.0
Cobalt	50	50	anr							
Copper	25	25	anr							
Gold	50	50								
Iron	100	100	anr							
Lead	5.0	10	anr							
Magnesium	5000	5000	anr							
Manganese	15	15	anr							
Molybdenum	100	100	anr							
Nickel	40	40	anr							
Palladium	50	50								
Platinum	50	50								
Potassium	5000	5000	anr							
Selenium	10	10	anr							
Silicon	100	100								
Silver	5.0	5.0	anr							
Sodium	5000	5000	anr							
Sulfur	50	50								
Strontium	10	10								
Thallium	5.0	10	anr							
Tin	100	100	anr							
Titanium	50	50	anr							
Tungsten	100	100								
Vanadium	10	10	anr							
Zinc	20	20	anr							

LOW CALIBRATION CHECK STANDARDS SUMMARY

Login Number: JB51845
Account: ALNJ - Accutest New Jersey
Project: ENVNJB: Pool, 750 Cliff Road, Port Reading, NJ

File ID: SA110613M2.ICP Date Analyzed: 11/06/13 Methods: SW846 6010C
QC Limits: CRI 70-130% CRIA 70-130% Run ID: MA16354 Units: ug/l

Time:			16:09		21:23		21:47		00:55	
Sample ID:	CRI	CRIA	CRI1		CRI2		CRIA1		CRIA2	
Metal	True	True	Results	% Rec	Results	% Rec	Results	% Rec	Results	% Rec
Zirconium	50	50								

(*) Outside of QC limits
(anr) Analyte not requested

LOW CALIBRATION CHECK STANDARDS SUMMARY

Login Number: JB51845
Account: ALNJ - Accutest New Jersey
Project: ENVNJB: Pool, 750 Cliff Road, Port Reading, NJ

File ID: SA110613M2.ICP   Date Analyzed: 11/06/13   Methods: SW846 6010C
QC Limits: 70 to 130 % Recovery   Run ID: MA16354   Units: ug/l

Time:		01:00		02:39	
Sample ID:	CRIB	CRIB1		CRIB2	
Metal	True	Results	% Rec	Results	% Rec
Aluminum	200				
Antimony	6.0				
Arsenic	10				
Barium	500				
Beryllium	4.0				
Boron	100				
Cadmium	4.0				
Calcium	5000				
Chromium	10	10.3	103.0	10.1	101.0
Cobalt	50				
Copper	25				
Gold	50				
Iron	100				
Lead	10				
Magnesium	5000				
Manganese	15				
Molybdenum	100				
Nickel	40				
Palladium	50				
Platinum	50				
Potassium	5000				
Selenium	25				
Silicon	100				
Silver	5.0				
Sodium	5000				
Sulfur	50				
Strontium	10				
Thallium	5.0				
Tin	100				
Titanium	50				
Tungsten	100				
Vanadium	10				
Zinc	100				

LOW CALIBRATION CHECK STANDARDS SUMMARY

Login Number: JB51845
Account: ALNJ - Accutest New Jersey
Project: ENVNJB: Pool, 750 Cliff Road, Port Reading, NJ

File ID: SA110613M2.ICP   Date Analyzed: 11/06/13   Methods: SW846 6010C
QC Limits: 70 to 130 % Recovery   Run ID: MA16354   Units: ug/l

Time:		01:00		02:39	
Sample ID:	CRIB	CRIB1		CRIB2	
Metal	True	Results	% Rec	Results	% Rec
Zirconium	50				

(*) Outside of QC limits
(anr) Analyte not requested

INTERFERING ELEMENT CHECK STANDARDS SUMMARY
Part 1 - ICSA and ICSAB Standards

Login Number: JB51845
Account: ALNJ - Accutest New Jersey
Project: ENVNJB: Pool, 750 Cliff Road, Port Reading, NJ

File ID: SA110613M2.ICP Date Analyzed: 11/06/13 Methods: SW846 6010C
QC Limits: 80 to 120 % Recovery Run ID: MA16354 Units: ug/l

Time:			16:13		16:18		21:27		21:32	
Sample ID:	ICSA	ICSAB	ICSA1		ICSAB1		ICSA2		ICSAB2	
Metal	True	True	Results	% Rec	Results	% Rec	Results	% Rec	Results	% Rec
Aluminum	500000	500000	531000	106.2	546000	109.2	510000	102.0	516000	103.2
Antimony		2000	-1.0		2010	100.5	0.70		2040	102.0
Arsenic		2000	0.20		2080	104.0	1.3		2080	104.0
Barium		500	3.3		533	106.6	2.9		509	101.8
Beryllium		500	0.0		486	97.2	0.0		464	92.8
Boron		1000	0.80		957	95.7	0.40		959	95.9
Cadmium		1000	1.7		987	98.7	1.6		968	96.8
Calcium	500000	500000	450000	90.0	465000	93.0	447000	89.4	452000	90.4
Chromium		500	-0.10		463	92.6	0.20		462	92.4
Cobalt		500	-0.60		457	91.4	-1.1		445	89.0
Copper		500	-1.1		482	96.4	-0.50		459	91.8
Gold		500	45.0		523	104.6	47.1		503	100.6
Iron	200000	200000	187000	93.5	194000	97.0	184000	92.0	187000	93.5
Lead		1000	5.9		866	86.6	5.1		871	87.1
Magnesium	500000	500000	500000	100.0	512000	102.4	474000	94.8	480000	96.0
Manganese		500	-0.20		472	94.4	-0.20		461	92.2
Molybdenum		1000	-2.8		939	93.9	-3.2		970	97.0
Nickel		1000	2.2		845	84.5	2.6		843	84.3
Palladium		500	-8.3		497	99.4	-3.2		476	95.2
Platinum		500	-5.5		478	95.6	-6.5		472	94.4
Potassium			134		267		-820		-840	
Selenium		2000	3.3		2000	100.0	1.8		2060	103.0
Silicon		2000	39.6		2050	102.5	40.0		2060	103.0
Silver		1000	1.0		1040	104.0	0.30		1040	104.0
Sodium			90.7		60.1		138		78.7	
Sulfur		500	95.5		576	115.2	85.6		556	111.2
Strontium		1000	-8.2		1050	105.0	-8.1		981	98.1
Thallium		2000	-0.80		1780	89.0	-0.10		1770	88.5
Tin		1000	-2.2		924	92.4	-1.6		941	94.1
Titanium		500	5.5		485	97.0	5.5		481	96.2
Tungsten		2000	-7.6		1800	90.0	-14		1760	88.0
Vanadium		500	0.20		477	95.4	0.10		474	94.8
Zinc		1000	-1.1		880	88.0	-1.1		859	85.9

INTERFERING ELEMENT CHECK STANDARDS SUMMARY
Part 1 - ICSA and ICSAB Standards

Login Number: JB51845
Account: ALNJ - Accutest New Jersey
Project: ENVNJB: Pool, 750 Cliff Road, Port Reading, NJ

File ID: SA110613M2.ICP Date Analyzed: 11/06/13 Methods: SW846 6010C
QC Limits: 80 to 120 % Recovery Run ID: MA16354 Units: ug/l

Time: / Sample ID: / Metal	ICSA True	ICSAB True	16:13 ICSA1 Results	% Rec	16:18 ICSAB1 Results	% Rec	21:27 ICSA2 Results	% Rec	21:32 ICSAB2 Results	% Rec
Zirconium		500	1.8		388	77.6*	0.0		363	72.6*

(*) Outside of QC limits
(anr) Analyte not requested

INTERFERING ELEMENT CHECK STANDARDS SUMMARY
Part 1 - ICSA and ICSAB Standards

Login Number: JB51845
Account: ALNJ - Accutest New Jersey
Project: ENVNJB: Pool, 750 Cliff Road, Port Reading, NJ

File ID: SA110613M2.ICP   Date Analyzed: 11/06/13   Methods: SW846 6010C
QC Limits: 80 to 120 % Recovery   Run ID: MA16354   Units: ug/l

Time:			02:44		02:49	
Sample ID:	ICSA	ICSAB	ICSA3		ICSAB3	
Metal	True	True	Results	% Rec	Results	% Rec
Aluminum	500000	500000	510000	102.0	505000	101.0
Antimony		2000	-0.30		2100	105.0
Arsenic		2000	-0.40		2090	104.5
Barium		500	3.1		503	100.6
Beryllium		500	0.0		459	91.8
Boron		1000	0.90		973	97.3
Cadmium		1000	1.4		960	96.0
Calcium	500000	500000	447000	89.4	441000	88.2
Chromium		500	0.10		461	92.2
Cobalt		500	-1.2		436	87.2
Copper		500	-0.40		446	89.2
Gold		500	48.4		491	98.2
Iron	200000	200000	184000	92.0	185000	92.5
Lead		1000	2.9		883	88.3
Magnesium	500000	500000	469000	93.8	462000	92.4
Manganese		500	-0.30		452	90.4
Molybdenum		1000	-3.1		1020	102.0
Nickel		1000	3.0		846	84.6
Palladium		500	1.2		470	94.0
Platinum		500	-4.2		468	93.6
Potassium			-780		-750	
Selenium		2000	-4.7		2140	107.0
Silicon		2000	39.2		2100	105.0
Silver		1000	-0.60		1050	105.0
Sodium			962		815	
Sulfur		500	86.0		553	110.6
Strontium		1000	-8.3		953	95.3
Thallium		2000	-0.70		1790	89.5
Tin		1000	-1.9		967	96.7
Titanium		500	5.2		478	95.6
Tungsten		2000	-24		1750	87.5
Vanadium		500	0.60		473	94.6
Zinc		1000	-1.1		836	83.6

10.1.6
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INTERFERING ELEMENT CHECK STANDARDS SUMMARY
Part 1 - ICSA and ICSAB Standards

Login Number: JB51845
Account: ALNJ - Accutest New Jersey
Project: ENVNJB: Pool, 750 Cliff Road, Port Reading, NJ

File ID: SA110613M2.ICP　　Date Analyzed: 11/06/13　　Methods: SW846 6010C
QC Limits: 80 to 120 % Recovery　　Run ID: MA16354　　Units: ug/l

Time:			02:44		02:49	
Sample ID:	ICSA	ICSAB	ICSA3		ICSAB3	
Metal	True	True	Results	% Rec	Results	% Rec
Zirconium		500	-0.40		345	69.0*

(*) Outside of QC limits
(anr) Analyte not requested

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: JB51845
Account: ALNJ - Accutest New Jersey
Project: ENVNJB: Pool, 750 Cliff Road, Port Reading, NJ

QC Batch ID: MP21988
Matrix Type: SOLID

Methods: SW846 6010C
Units: mg/kg

Prep Date: 11/06/13

Metal	RL	IDL	MDL	MB raw	final
Aluminum	20	2.2	3.6		
Antimony	1.0	.11	.15		
Arsenic	1.0	.12	.21		
Barium	5.0	.053	.073		
Beryllium	0.40	.015	.024		
Boron	10	.049	.11		
Cadmium	0.40	.004	.042		
Calcium	500	.74	6.3		
Chromium	1.0	.038	.095	0.040	<1.0
Cobalt	5.0	.015	.047		
Copper	2.5	.052	.56		
Gold	5.0	.14	.43		
Iron	10	.5	.87		
Lead	1.0	.095	.17		
Magnesium	500	4.7	5.1		
Manganese	1.5	.004	.04		
Molybdenum	10	.029	.07		
Nickel	4.0	.025	.044		
Palladium	5.0	.19	.64		
Platinum	5.0	.59	1.5		
Potassium	500	5.6	8.6		
Selenium	1.0	.18	.35		
Silicon	10	.13	3.3		
Silver	0.50	.056	.13		
Sodium	500	3.3	3.3		
Sulfur	5.0	.34	.82		
Strontium	1.0	.015	.03		
Thallium	1.0	.098	.13		
Tin	10	.035	.14		
Titanium	5.0	.044	.14		
Tungsten	10	.56	.94		
Vanadium	1.0	.058	.13		
Zinc	2.0	.021	.16		

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: JB51845
Account: ALNJ - Accutest New Jersey
Project: ENVNJB: Pool, 750 Cliff Road, Port Reading, NJ

QC Batch ID: MP21988
Matrix Type: SOLID

Methods: SW846 6010C
Units: mg/kg

Prep Date: 11/06/13

Metal	RL	IDL	MDL	MB raw	final
Zirconium	5.0	.18	.088		

Associated samples MP21988: JB51845-1, JB51845-2

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

10.2.1
10

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: JB51845
Account: ALNJ - Accutest New Jersey
Project: ENVNJB: Pool, 750 Cliff Road, Port Reading, NJ

QC Batch ID: MP21988
Matrix Type: SOLID

Methods: SW846 6010C
Units: mg/kg

Prep Date: 11/06/13

Metal	MC25944-1 Original	MS	Spikelot MPICP	% Rec	QC Limits
Aluminum					
Antimony					
Arsenic	anr				
Barium	anr				
Beryllium					
Boron					
Cadmium	anr				
Calcium					
Chromium	8.3	50.7	41.7	101.7	75-125
Cobalt					
Copper	anr				
Gold					
Iron					
Lead	anr				
Magnesium					
Manganese					
Molybdenum	anr				
Nickel	anr				
Palladium					
Platinum					
Potassium					
Selenium	anr				
Silicon					
Silver	anr				
Sodium					
Sulfur					
Strontium					
Thallium					
Tin	anr				
Titanium	anr				
Tungsten					
Vanadium					
Zinc	anr				

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: JB51845
Account: ALNJ - Accutest New Jersey
Project: ENVNJB: Pool, 750 Cliff Road, Port Reading, NJ

QC Batch ID: MP21988
Matrix Type: SOLID

Methods: SW846 6010C
Units: mg/kg

Prep Date: 11/06/13

Metal	MC25944-1 Original	MS	Spikelot MPICP	% Rec	QC Limits
Zirconium					

Associated samples MP21988: JB51845-1, JB51845-2

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: JB51845
Account: ALNJ - Accutest New Jersey
Project: ENVNJB: Pool, 750 Cliff Road, Port Reading, NJ

QC Batch ID: MP21988
Matrix Type: SOLID

Methods: SW846 6010C
Units: mg/kg

Prep Date: 11/06/13

Metal	MC25944-1 Original	MSD	Spikelot MPICP	% Rec	MSD RPD	QC Limit
Aluminum						
Antimony						
Arsenic	anr					
Barium	anr					
Beryllium						
Boron						
Cadmium	anr					
Calcium						
Chromium	8.3	50.9	41.7	102.1	0.4	20
Cobalt						
Copper	anr					
Gold						
Iron						
Lead	anr					
Magnesium						
Manganese						
Molybdenum	anr					
Nickel	anr					
Palladium						
Platinum						
Potassium						
Selenium	anr					
Silicon						
Silver	anr					
Sodium						
Sulfur						
Strontium						
Thallium						
Tin	anr					
Titanium	anr					
Tungsten						
Vanadium						
Zinc	anr					

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: JB51845
Account: ALNJ - Accutest New Jersey
Project: ENVNJB: Pool, 750 Cliff Road, Port Reading, NJ

QC Batch ID: MP21988
Matrix Type: SOLID

Methods: SW846 6010C
Units: mg/kg

Prep Date: 11/06/13

Metal	MC25944-1 Original	MSD	Spikelot MPICP	% Rec	MSD RPD	QC Limit
Zirconium						

Associated samples MP21988: JB51845-1, JB51845-2

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: JB51845
Account: ALNJ - Accutest New Jersey
Project: ENVNJB: Pool, 750 Cliff Road, Port Reading, NJ

QC Batch ID: MP21988
Matrix Type: SOLID

Methods: SW846 6010C
Units: mg/kg

Metal	BSP Result	Spikelot MPICP	% Rec	QC Limits	BSD Result	Spikelot MPICP	% Rec	BSD RPD	QC Limit
Prep Date:			11/06/13					11/06/13	
Aluminum									
Antimony									
Arsenic	anr								
Barium	anr								
Beryllium									
Boron									
Cadmium	anr								
Calcium									
Chromium	52.5	50	105.0	80-120	52.8	50	105.6	0.6	20
Cobalt									
Copper	anr								
Gold									
Iron									
Lead	anr								
Magnesium									
Manganese									
Molybdenum	anr								
Nickel	anr								
Palladium									
Platinum									
Potassium									
Selenium	anr								
Silicon									
Silver	anr								
Sodium									
Sulfur									
Strontium									
Thallium									
Tin	anr								
Titanium	anr								
Tungsten									
Vanadium									
Zinc	anr								

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: JB51845
Account: ALNJ - Accutest New Jersey
Project: ENVNJB: Pool, 750 Cliff Road, Port Reading, NJ

QC Batch ID: MP21988
Matrix Type: SOLID

Methods: SW846 6010C
Units: mg/kg

Prep Date:			11/06/13				11/06/13		
Metal	BSP Result	Spikelot MPICP	% Rec	QC Limits	BSD Result	Spikelot MPICP	% Rec	BSD RPD	QC Limit
Zirconium									

Associated samples MP21988: JB51845-1, JB51845-2

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: JB51845
Account: ALNJ - Accutest New Jersey
Project: ENVNJB: Pool, 750 Cliff Road, Port Reading, NJ

QC Batch ID: MP21988
Matrix Type: SOLID

Methods: SW846 6010C
Units: mg/kg

Prep Date: 11/06/13

Metal	LCS Result	Spikelot MPLCS78	% Rec	QC Limits
Aluminum				
Antimony				
Arsenic	anr			
Barium	anr			
Beryllium				
Boron				
Cadmium	anr			
Calcium				
Chromium	72.5	69.3	104.6	81-119
Cobalt				
Copper	anr			
Gold				
Iron				
Lead	anr			
Magnesium				
Manganese				
Molybdenum	anr			
Nickel	anr			
Palladium				
Platinum				
Potassium				
Selenium	anr			
Silicon				
Silver	anr			
Sodium				
Sulfur				
Strontium				
Thallium				
Tin	anr			
Titanium	anr			
Tungsten				
Vanadium				
Zinc	anr			

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: JB51845
Account: ALNJ - Accutest New Jersey
Project: ENVNJB: Pool, 750 Cliff Road, Port Reading, NJ

QC Batch ID: MP21988
Matrix Type: SOLID

Methods: SW846 6010C
Units: mg/kg

Prep Date: 11/06/13

Metal	LCS Result	Spikelot MPLCS78	% Rec	QC Limits
Zirconium				

Associated samples MP21988: JB51845-1, JB51845-2

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

SERIAL DILUTION RESULTS SUMMARY

Login Number: JB51845
Account: ALNJ - Accutest New Jersey
Project: ENVNJB: Pool, 750 Cliff Road, Port Reading, NJ

QC Batch ID: MP21988
Matrix Type: SOLID

Methods: SW846 6010C
Units: ug/l

Prep Date: 11/06/13

Metal	MC25944-1 Original	SDL 1:5	%DIF	QC Limits
Aluminum				
Antimony				
Arsenic	anr			
Barium	anr			
Beryllium				
Boron				
Cadmium	anr			
Calcium				
Chromium	99.8	106	6.4	0-10
Cobalt				
Copper	anr			
Gold				
Iron				
Lead	anr			
Magnesium				
Manganese				
Molybdenum	anr			
Nickel	anr			
Palladium				
Platinum				
Potassium				
Selenium	anr			
Silicon				
Silver	anr			
Sodium				
Sulfur				
Strontium				
Thallium				
Tin	anr			
Titanium	anr			
Tungsten				
Vanadium				
Zinc	anr			

SERIAL DILUTION RESULTS SUMMARY

Login Number: JB51845
Account: ALNJ - Accutest New Jersey
Project: ENVNJB: Pool, 750 Cliff Road, Port Reading, NJ

QC Batch ID: MP21988
Matrix Type: SOLID

Methods: SW846 6010C
Units: ug/l

Prep Date: 11/06/13

Metal	MC25944-1 Original	SDL 1:5	%DIF	QC Limits
Zirconium				

Associated samples MP21988: JB51845-1, JB51845-2

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

POST DIGESTATE SPIKE SUMMARY

Login Number: JB51845
Account: ALNJ - Accutest New Jersey
Project: ENVNJB: Pool, 750 Cliff Road, Port Reading, NJ

QC Batch ID: MP21988
Matrix Type: SOLID

Methods: SW846 6010C
Units: ug/l

Prep Date: 11/06/13

Metal	Sample ml	Final ml	MC25944-1 Raw	Corr.**	PS ug/l	Spike ml	Spike ug/ml	Spike ug/l	% Rec	QC Limits
Aluminum										
Antimony										
Arsenic										
Barium										
Beryllium										
Boron										
Cadmium										
Calcium										
Chromium										
Cobalt										
Copper										
Gold										
Iron										
Lead										
Magnesium										
Manganese										
Molybdenum										
Nickel										
Palladium										
Platinum										
Potassium										
Selenium										
Silicon										
Silver										
Sodium										
Sulfur										
Strontium										
Thallium										
Tin										
Titanium										
Tungsten										
Vanadium										
Zinc										

POST DIGESTATE SPIKE SUMMARY

Login Number: JB51845
Account: ALNJ - Accutest New Jersey
Project: ENVNJB: Pool, 750 Cliff Road, Port Reading, NJ

QC Batch ID: MP21988
Matrix Type: SOLID

Methods: SW846 6010C
Units: ug/l

Prep Date: 11/06/13

Metal	Sample ml	Final ml	MC25944-1 Raw	Corr.**	PS ug/l	Spike ml	Spike ug/ml	Spike ug/l	% Rec	QC Limits
Zirconium										

Associated samples MP21988: JB51845-1, JB51845-2

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(**) Corr. sample result = Raw * (sample volume / final volume)
(anr) Analyte not requested

POST DIGESTATE SPIKE SUMMARY

Login Number: JB51845
Account: ALNJ - Accutest New Jersey
Project: ENVNJB: Pool, 750 Cliff Road, Port Reading, NJ

QC Batch ID: MP21988
Matrix Type: SOLID

Methods: SW846 6010C
Units: ug/l

Prep Date: 11/06/13

Metal	Sample ml	Final ml	MC24967-1T Raw	Corr.**	PS ug/l	Spike ml	Spike ug/ml	Spike ug/l	% Rec	QC Limits
Aluminum										
Antimony										
Arsenic										
Barium										
Beryllium										
Boron										
Cadmium										
Calcium										
Chromium										
Cobalt										
Copper										
Gold										
Iron										
Lead										
Magnesium										
Manganese										
Molybdenum										
Nickel										
Palladium										
Platinum										
Potassium										
Selenium										
Silicon										
Silver										
Sodium										
Sulfur										
Strontium										
Thallium										
Tin										
Titanium										
Tungsten										
Vanadium										
Zinc										

POST DIGESTATE SPIKE SUMMARY

Login Number: JB51845
Account: ALNJ - Accutest New Jersey
Project: ENVNJB: Pool, 750 Cliff Road, Port Reading, NJ

QC Batch ID: MP21988
Matrix Type: SOLID

Methods: SW846 6010C
Units: ug/l

Prep Date: 11/06/13

Metal	Sample ml	Final ml	MC24967-1T Raw	Corr.**	PS ug/l	Spike ml	Spike ug/ml	Spike ug/l	% Rec	QC Limits
Zirconium										

Associated samples MP21988: JB51845-1, JB51845-2

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(**) Corr. sample result = Raw * (sample volume / final volume)
(anr) Analyte not requested

Appendix XVI

Monitoring Well Records

DWR-138 M
8/00

New Jersey Department of Environmental Protection
Bureau of Water Allocation

AB1

MONITORING WELL RECORD

Well Permit No. 26 - 63927

Atlas Sheet Coordinates 26 : 31 : 926

OWNER IDENTIFICATION - Owner AMERADA HESS CORP
Address 1 HESS PLAZA
City WOODBRIDGE State NJ Zip Code

WELL LOCATION - If not the same as owner please give address. Owner's Well No. AB1
County MIDDLESEX Municipality WOODBRIDGE TWP Lot No. Block No.
Address 750 CLIFF RD

TYPE OF WELL (as per Well Permit Categories) MONITORING
DATE WELL STARTED 4/12/02
DATE WELL COMPLETED 4/12/02
Regulatory Program Requiring Well Case I.D.#

CONSULTING FIRM/FIELD SUPERVISOR (if applicable) Amerada Hess Corporation Tele. #

WELL CONSTRUCTION

Total depth drilled 10' ft.
Well finished to 10' ft.

Borehole diameter:
Top 12" in.
Bottom 12" in.

Well was finished: ☒ above grade ☐ flush mounted

If finished above grade, casing height (stick up) above land surface 3' ft.

Steel protective casing installed? ☒ Yes ☐ No

Static water level after drilling 5' ft.
Water level was measured using Tape
Well was developed for 1/2 hours at 1/2 gpm
Method of development pump

Note: Measure all depths from land surface	Depth to Top (ft.)	Depth to Bottom (ft.)	Diameter (inches)	Material	Wgt./Rating (lbs/sch no.)
Single/Inner Casing	+3'	2'	4"	PVC	sch 40
Middle Casing (for triple cased wells only)					
Outer Casing (largest diameter)					
Open Hole or Screen (No. Used)	2'	10'	4"	PVC	.010 sch 40
Blank Casings (No. Used)					
Tail Piece					
Gravel Pack	1'	10'		Morie #2	
Grout	0'	1'		Neat Cement Bentonite	~~94~~ lbs. ~~5~~ lbs.

Grouting Method gravity
Drilling Method Auger

Was permanent pumping equipment installed? ☐ Yes ☒ No
Pump capacity gpm
Pump type:
Drilling Fluid Type of Rig B-59
Health and Safety Plan submitted? ☒ Yes ☐ No
Level of Protection used on site (circle one) None D C B A

GEOLOGIC LOG

Note each depth where water was encountered in consolidated formations.

See Attached

I certify that I have constructed the above referenced well in accordance with all well permit requirements and applicable State rules and regulations.

Drilling Company SUMMIT WELL DRILLING CO INC
Well Driller (Print) John Murtha
Driller's Signature John Murtha
Registration No. J21245 Date 5/15/02

AS-BUILT WELL LOCATION
(NAD 83 HORIZONTAL DATUM)
NJ STATE PLANE COORDINATE IN US SURVEY FEET

NORTHING: ________ EASTING: ________
OR
LATITUDE: __° __' __.__" LONGITUDE: __° __' __.__"

COPIES: White - DEP Canary - Driller Pink - Owner Goldenrod - Health Dept.

AB1

Summit® DRILLING CO., INC.
ENVIRONMENTAL SPECIALISTS

Chimney Rock Road, Bldg. 9W
Bound Brook, NJ 08805
Telephone: (908) 722-4266
Toll Free: (800) 242-6648
FAX: (732) 356-1009
http://www.summitdrilling.com
email: info@summitdrilling.com

WELL LOG

WELL: AB1 DATE DRILLED: 04/12/2002 COORD #1: 26.31.926 PERMIT #1: 26-63927
COORD #2: PERMIT #2:
SITE: Port Reading Refinery, , 750 Cliff Road, Port Reading, NJ 07064-0000 COUNTY: Middlesex
OWNER: Amerada Hess Corporation, P.O. Box 500, 1 Hess Plaza, WB 6, Woodbridge, NJ 07095 XSTREET: Port Reading Avenue
USE: Monitor

INNER CASING: PVC
DIAMETER: 4"
LENGTH: 5'

OUTER CASING:
DIAMETER:
LENGTH:

SCREEN TYPE 1: PVC
SCREEN TYPE 2:
DIAMETER: 4"
LENGTH 1: 8'
LENGTH 2:
SLOT SIZE: .010

DRILLING METHOD: Auger
SAMPLING METHOD:
HOLE DIA: 12", 12"
TOTAL DEPTH: 10'

SET WELL: 10'
GRAVEL PK SZ: Morie #2
DRILLER: John Murtha
SURFACE COMPLETION: S

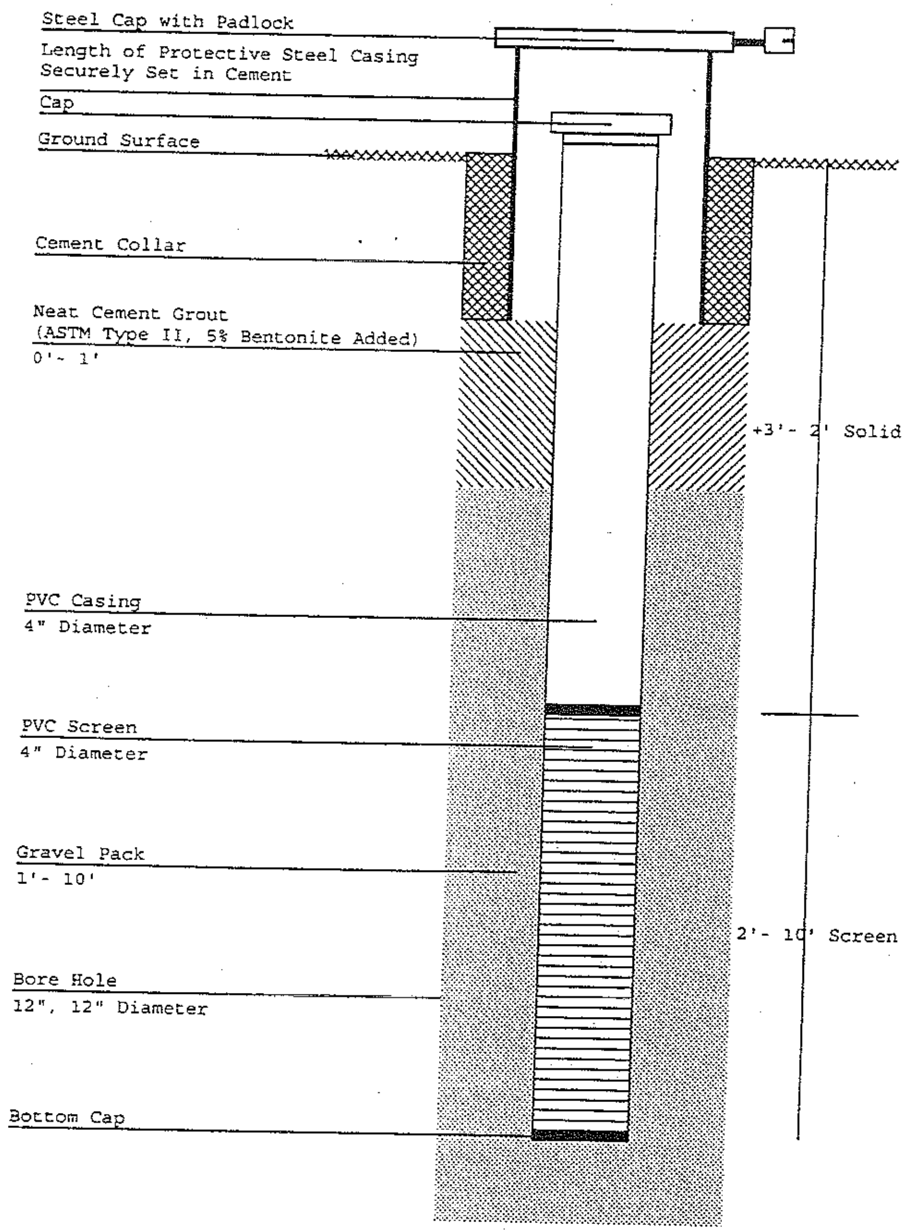
GAL PER MIN: 1/2
STAT H20 LVL: 5'
DEVELOPMENT METHOD: pump
DEVELOPMENT TIME: 1/2

CASING SEAL: Portland
OPEN HOLE:

DEPTH BELOW SURFACE FROM - TO	BLOWS PER 6" ON SAMPLER

REMARKS / SOILS IDENTIFICATION

0'- 5' Fill.
5'- 10' Grey silty sand.



AB1

MONITORING WELL LOG

Sheet __ of __

Project Name: Hess Refinery	**Well Identification:** AB-01
Street Address: Port Reading Refinery	**Well Coordinate Number:**
Tax Map Address:	**Well Permit Number:**
County: Middlesex	**Latitude:** ; **Longitude:**
Owner: Amerada Hess Corporation	**Casing Elevation:** ; **Surface Elevation:**
Owner's Representative: Frank Sarelement; Sr. Hydrogeologist	**Well Depth:**
Owner's Address: Port Reading, NJ	**Screen Length:** ; **Casing Length:**
GES Project Manager: James Coyne	**Drilling Method:**
GES Case Manager: John H. Montgomery, P.G.	**Well Diameter:**
NJDEP Case Number:	**Borehole Diameter:** 11.0 inches
NJPDES Permit Number:	**Sampling Method:**
Driller: Summit Drilling Co.	**Static Water Depth:**
Driller's Address: Chimney Rock Rd., Bldg 9W, Bound Brook, NJ	**Logged By:** John H. Montgomery, P.G.
Driller's License Number:	**Completion Date:** 4/12/02

Depth (feet)	Sample Number	Well Detail	PID (units)	Blow Count Recovery (inches)	Depth (feet)	Lithology/Remarks (Modified Burmister Classification)
						Previously cleared to 5' using a vactron
5			0	1,7,15,21 12"		6.5-7.0' Grayish-black coarse to M Sand, little well rounded qtz pebbles & gravel, some (+) silt. Very moist. 6.0-6.5': Greenish-gray silty F-VF Sand, little clay, trace (-) semi-rounded qtz pebbles.
7			0	10,14,10,7 13"		Brownish-gray to brown Very coarse to M Sand. Wet. trace (-) well rounded qtz gravel, some (+) well rounded qtz pebbles.
9			0	12,14,14,16 14"		Dense, plastic, brownish-green clay w/ some wood fragments throughout. Strong septic-like odor. Very moist
						Drilled to 10' (Beginning to rain) Well constructed using 8' of Sch. 40, 4-inch diameter PVC and 5' solid riser. Set no. 1 sand to 1' above well screen followed by No 0 Sand to ~0.6' bgs. Added concrete to surface + set 6-inch outer casing (steel) ~ 1.5' bgs.

MONITORING WELL CERTIFICATION FORM B - LOCATION CERTIFICATION

Name of Owner: HESS CORPORATION

Name of Facility: PORT READING REFINERY

Location: 750 CLIFF RD. PORT READING (WOODBRIDGE) NJ

Case Number(s): ______________________________ (UST #, ISRA #, Incident #, or EPA #)

LAND SURVEYOR'S CERTIFICATION

Well Permit Number: __ __ - __ __ __ __ __ __ - __

(This number must be permanently affixed to the well casing.)

Owners Well Number (As shown on application or plans): AB-1

Geographic Coordinate NAD 83 (to nearest 1/10 of second):

Longitude: West 74 14' 46.59" Latitude: North 40 33' 35.14"

New Jersey State Plane Coordinates NAD 83 to nearest 10 feet:

North 628,918 East 562,618

Elevation of Top of Inner Casing (cap off) at reference mark (nearest 0.01'): 13.85

Source of elevation datum (benchmark, number/description and elevation/datum. If an on-site datum is used, identify here, assume datum of 100', and give approximated actual elevation.)

NGVD 1929 DATUM REFERENCE MONUMENT USC&GS # 350 ELEVATION 15.76

Significant observations and notes: ____

____

AUTHENTICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

SEAL

Nancy J. Scott

PROFESSIONAL LAND SURVEYOR'S SIGNATURE

FEB. 4, 2013
DATE

NANCY J. SCOTT, P.L.S. NJ License No. GS 35875

ENSURPLAN, INC. P.O Box 4304 Warren, NJ 07059 732-469-0400

PROFESSIONAL LAND SURVEYOR'S ADDRESS AND PHONE NUMBER

DWR-138 M
8/00

AB2

New Jersey Department of Environmental Protection
Bureau of Water Allocation

MONITORING WELL RECORD

Well Permit No. 26 25 63926

Atlas Sheet Coordinates 25 : [illegible] : [illegible]

OWNER IDENTIFICATION - Owner AMERADA HESS CORP
Address 1 HESS PLAZA
City WOODBRIDGE State NJ Zip Code

WELL LOCATION - If not the same as owner please give address. Owner's Well No. ~~AB2~~ AB2
County MIDDLESEX Municipality WOODBRIDGE TWP Lot No. 2 Block No. 7608
Address 4 CLIFF RD

TYPE OF WELL (as per Well Permit Categories) MONITORING
DATE WELL STARTED 4 / 8 / 02
DATE WELL COMPLETED 4 / 8 / 02
Regulatory Program Requiring Well Case I.D.#

CONSULTING FIRM/FIELD SUPERVISOR (if applicable) Amerada Hess Corporation Tele. #

WELL CONSTRUCTION

Total depth drilled 14' ft.
Well finished to 14' ft.

Borehole diameter:
Top 12" in.
Bottom 12" in.

Well was finished: [X] above grade
[ ] flush mounted

If finished above grade, casing height (stick up) above land surface 2' ft.

[illegible] steel protective casing installed?
[X] Yes [ ] No

Static water level after drilling 5' ft.

Water level was measured using Tape

Well was developed for 1/2 hours at 1/2 gpm

Method of development pump

Was permanent pumping equipment installed? [ ] Yes [X] No

Pump capacity gpm

Pump type:

Drilling Fluid Type of Rig B-59

Health and Safety Plan submitted? [X] Yes [ ] No

Level of Protection used on site (circle one) None D C B A

Note: Measure all depths from land surface	Depth to Top (ft.)	Depth to Bottom (ft.)	Diameter (inches)	Material	Wgt./Rating (lbs/sch no.)
Single/Inner Casing	+3'	2'	4"	PVC	sch 40
Middle Casing (for triple cased wells only)					
Outer Casing (largest diameter)					
Open Hole or Screen (No. Used)	2'	14'	4"	PVC	.010 sch 40
Blank Casings (No. Used)					
Tail Piece					
Gravel Pack	1'	14'		Morie #2	
Grout	0'	1'		Neat Cement Bentonite	94 lbs. 5 lbs.

Grouting Method gravity
Drilling Method Auger

GEOLOGIC LOG

Note each depth where water was encountered in consolidated formations.

See Attached

I certify that I have constructed the above referenced well in accordance with all well permit requirements and applicable State rules and regulations.

Drilling Company SUMMIT WELL DRILLING CO INC

Well Driller (Print) John Murtha

Driller's Signature John Murtha

Registration No. J21245 Date 5 / 15 / 02

AS-BUILT WELL LOCATION
(NAD 83 HORIZONTAL DATUM)
NJ STATE PLANE COORDINATE IN US SURVEY FEET

NORTHING: ________ EASTING: ________

OR

LATITUDE: __ ° __ ' __ . __ " LONGITUDE: __ ° __ ' __ . __ "

COPIES: White - DEP Canary - Driller Pink - Owner Goldenrod - Health Dept.

AB2

Summit Drilling Co., Inc.
Environmental Specialists

Chimney Rock Road, Bldg. 9W
Bound Brook, NJ 08805
Telephone: (908) 722-4266
Toll Free: (800) 242-6648
FAX: (732) 356-1009
http://www.summitdrilling.com
email: info@summitdrilling.com

WELL LOG

WELL: ~~AB2~~ AB2 DATE DRILLED: 04/08/2002 COORD #1: 26.31.926 PERMIT #1: 26-63926
COORD #2: PERMIT #2:
SITE: Port Reading Refinery, , 750 Cliff Road, Port Reading, NJ 07064-0000 COUNTY: Middlesex
OWNER: Amerada Hess Corporation, P.O. Box 500, 1 Hess Plaza, WB 6, Woodbridge, NJ 07095 XSTREET: Port Reading Avenue
USE: Monitor

INNER CASING: PVC
DIAMETER: 4"
LENGTH: 5'

OUTER CASING:
DIAMETER:
LENGTH:

SCREEN TYPE 1: PVC
SCREEN TYPE 2:
DIAMETER: 4"
LENGTH 1: 12'
LENGTH.2:
SLOT SIZE: .010

DRILLING METHOD: Auger
SAMPLING METHOD:
HOLE DIA: 12", 12"
TOTAL DEPTH: 14'

SET WELL: 14'
GRAVEL PK SZ: Morie #2
DRILLER: John Murtha
SURFACE COMPLETION: S

GAL PER MIN: 1/2
STAT H2O LVL: 5'

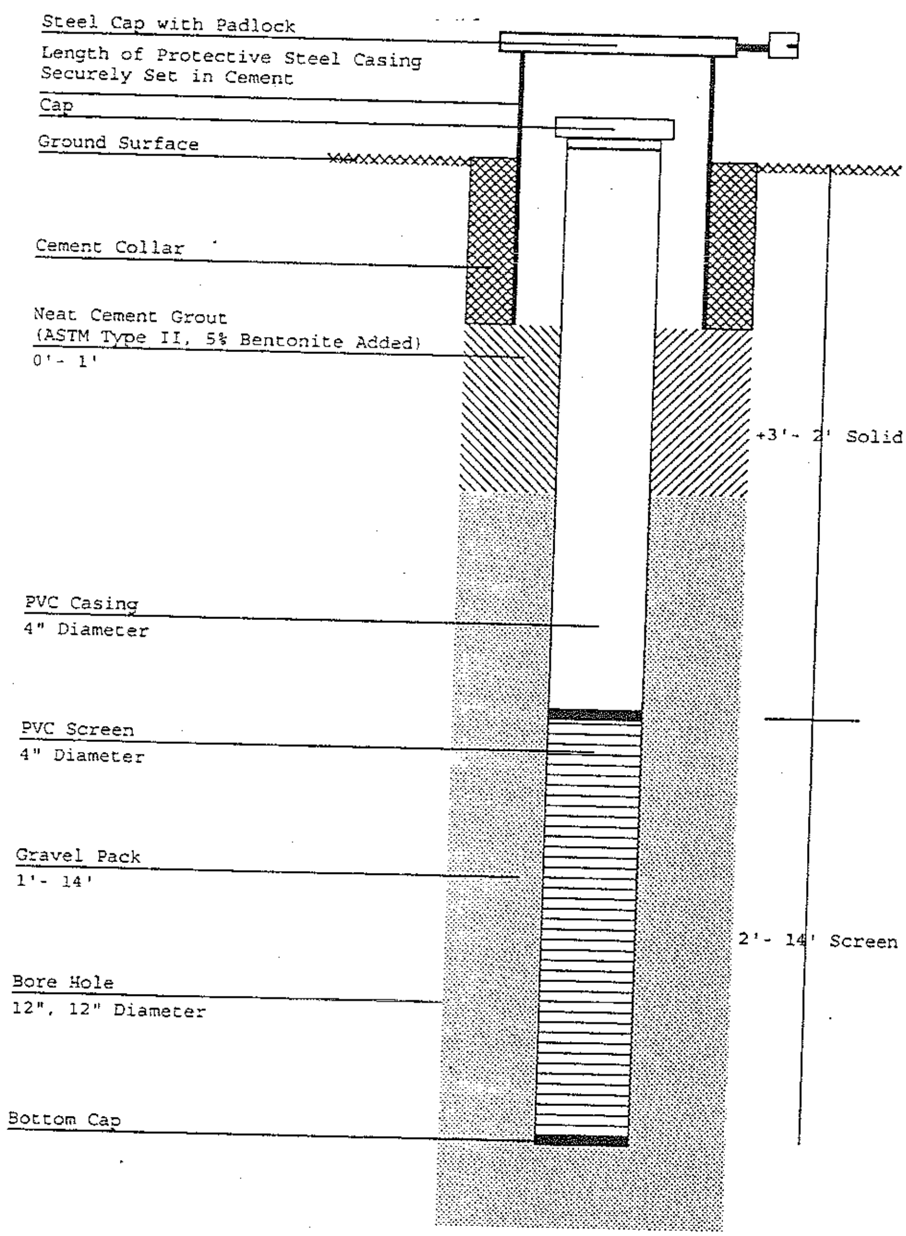
DEVELOPMENT METHOD: pump
DEVELOPMENT TIME: 1/2

CASING SEAL: Portland
OPEN HOLE:

DEPTH BELOW SURFACE FROM - TO	BLOWS PER 6" ON SAMPLER
-	

REMARKS / SOILS IDENTIFICATION

0'- 5' Fill.
5'- 14' Grey silty sand.



MONITORING WELL LOG

Project Name: Amerada Hess Corporation - Port Reading Refinery	**Well Identification:** MW-AB2
Street Address: Port Reading Refinery	**Well Coordinate Number:**
City, State: Port Reading, New Jersey	**Well Permit Number:**
County: Middlesex	**Latitude:** ; **Longitude:**
Owner: Amerada Hesss Corporation	**Casing Elevation:** feet; **Surface Elevation:** feet
Owner's Representative: Frank Sanclementi, Senior Hydrogeologis	**Well Depth:** 14 feet
Owner's Address: #1 Hess Plaza, Woodbridge, NJ	**Screen Length:** 12 feet; **Casing Length:** 5 feet
GES Project Manager: James Coyne, P.G.	**Drilling Method:** Hollow stem auger
GES Case Manager:	**Well Diameter:** 4.0 inches
NJDEP Case Number:	**Borehole Diameter:** 11.0 inches
NJPDES Permit Number: Not applicable	**Sampling Method:** Split-Spoon Sampler and/or Drill cuttings
Driller: Summit Drilling Company	**Static Water Depth:** 3 feet
Driller's Address: Chimney Rock Road, Bldg #9W, Bound Brook, N	**Logged By:** Robert C. Landle, P.G. / ~~John M. Montgomery, P.G.~~
Driller's License Number: JD21245	**Completion Date:** 4/8/02

Depth (feet)	Sample Number	Well Detail	PID (units)	Blow Count Recovery (inches)	Depth (feet)	Lithology/Remarks (Modified Burmister Classification)
1			Stick up +3'		0-5	VACTRON CLEARED
2						
3						
4						
5						
6			0 in BREATHING	1 1	5-7	NO RECOVERY
7				1 1		
8			0	11 17	7-9	(REC=7") LIGHT BROWN TO ORANGE BROWN COARSE TO FINE SAND, trace SILT.
9			0	19 24		
10			0	10 10	9-11	(REC=15") TOP 10" - SAME AS 7-9' Bottom 5" - GRAY COARSE TO FINE SAND, trace SILT w/ fine gravel.
11			0	20 22		
12			0	22 10	11-13	(REC=20") DARK GRAY TO GREENISH GRAY COARSE TO FINE SAND, LITTLE fine GRAVEL, Little Silt.
13			0	7 5		
14	S-1 13'6"-14'0"		0 @ 6" 4.2 @ 12"	7 7	13-15	(REC=24") TOP 6" = GRAY COARSE TO FINE SAND, trace SILT. NEXT 4" of LIGHT BROWN FINE SAND, Little SILT. BOTTOM 12" = BROWN PEAT and DARK GRAY ORGANIC SILT.
15			14.2 @ 15" 4.0 @ 24"	6 6		
						END OF BORING @ 15' SCREEN = 14 - 2' RISER = 2 - +3'
						End boring at 15 feet

Note: Numbers in the column labeled "Blow Count" refer to the number of blows required to drive a standard split-spoon sampler a distance of 6.0 inches using a 140-pound drop weight falling 30 inches. A standard split-spoon sampler is 2.0-inch outer diameter and 1.375-inch inner diameter.

AB2

MONITORING WELL CERTIFICATION FORM B - LOCATION CERTIFICATION

Name of Owner: Amerada Hess Corporation

Name of Facility: Port Reading Refinery

Location: West Avenue, Port Reading, (Woodbridge Township), NJ

Case Number(s): ______________ (UST #, ISRA #, Incident #, or EPA #)

LAND SURVEYOR'S CERTIFICATION

Well Permit Number:
(This number must be permanently affixed to the well casing.) __-__-__

Owners Well Number (As shown on application or plans): AB 2

Geographic Coordinate NAD 83 (to nearest 1/10 of second):

Longitude: West 74° 14' 39.9" Latitude: North 40° 33' 34.4"

New Jersey State Plane Coordinates NAD 83 to nearest 10 feet:

North 628852.448 East 563133.657

Elevation of Top of Inner Casing (cap off) at reference mark (nearest 0.01'): 12.03

Source of elevation datum (benchmark, number/description and elevation/datum. If an on-site datum is used, identify here, assume datum of 100', and give approximated actual elevation.)

U.S.C. & G.S. Monument No. 350 - Elevation 15.76

Significant observations and notes: ______________

AUTHENTICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

SEAL

William N. Scott

PROFESSIONAL LAND SURVEYOR'S SIGNATURE

7-01-2002

DATE

William N. Scott, PLS New Jersey License No. 17421

PROFESSIONAL LAND SURVEYOR'S NAME AND LICENSE NUMBER
(Please print or type)

ENSURPLAN, INC.
P.O. BOX 4304, Warren, NJ 07059 (908-668-7701

AB2R

6

New Jersey Department of Environmental Protection
Bureau of Water Allocation

MONITORING WELL RECORD

Well Permit Number P200800553

Atlas Sheet Coordinates 2631921

OWNER IDENTIFICATION HESS CORPORATION

Address 1 HESS PLAZA

City Woodbridge State New Jersey Zip Code 07095

WELL LOCATION - If not the same as owner please give address Owner's Well No. AB-2R

County Middlesex Municipality Woodbridge Twp Lot No. 2 & 3 Block No. 760B & A

Address 750 CLIFF ROAD / (PER6) PORT READING REFINERY

WELL USE Monitoring

DATE WELL STARTED 10/6/08

DATE WELL COMPLETED 10/10/08

WELL CONSTRUCTION

Total Depth Drilled 20 ft.

Finished Well Depth 20 ft.

Borehole Diameter:

Top 10 in.

Bottom 10 in.

Well was finished: ☐ above grade ☑ flush mounted

If finished above grade, casing height (stick up) above land surface — ft.

Steel protective casing installed? ☐ Yes ☑ No

Static Water Level after drilling 19 ft.

Water Level was Measured Using tape

Well was developed for 1/2 hours at 2 gpm

Method of development pump

Pump Capacity N/A gpm

Pump Type

Drilling Fluid Type of Rig B61

Health and Safety Plan Submitted? ☑ Yes ☐ No

Level of Protection used on site (circle one) None D C B A

Note: Measure all depths from land surface	Depth to Top (ft.)	Depth to Bottom (ft.)	Diameter (inches)	Material	Wgt./Rating (lbs/sch no.)
Single/Inner Casing	0	1	4	PVC	Sch 40
Middle Casing (for triple cased wells only)					
Outer Casing (largest diameter)					
Open Hole or Screen (No. Used .010)	1	20	4	PVC	Sch 40
Blank Casings (No. Used)					
Tail Piece					
Gravel Pack	.5	20		#1 Sand	
Grout	0	.5		Neat Cement / Bentonite	188 lbs / 10 lbs

Grouting Method tremie

Drilling Method Hollow Stem Auger

GEOLOGIC LOG

Note each depth where water was encountered in consolidated formations

0-5' Fill

5-10' CMF Brown Silt, Sands/Gravel

10'-25' CMF Brown Silty Sand, Gravel

I certify that I have constructed the above referenced well in accordance with all well permit requirements and applicable State rules and regulations.

Drilling Company SUMMIT DRILLING CO INC

Well Driller (Print) Jeff Segreaves

Driller's Signature Jeff Segreaves

Registration No. J1169991 Date 10/20/08

AS-BUILT WELL LOCATION
(NAD 83 HORIZONTAL DATUM)

NJ STATE PLANE COORDINATE IN US SURVEY FEET

NORTHING: 628893 EASTING: 563244

OR

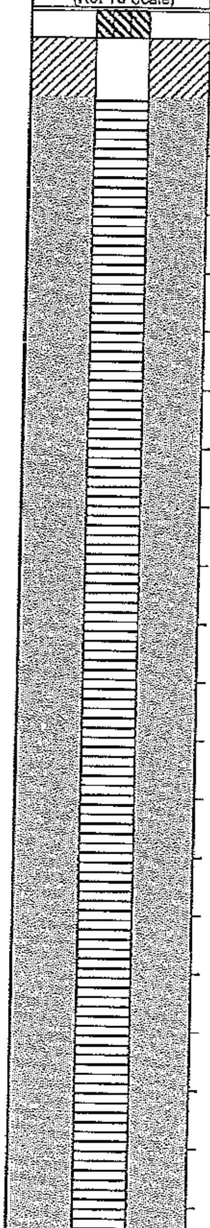
LATITUDE: ° ' " LONGITUDE: ° ' "

ORIGINAL: DEP *COPIES: DRILLER OWNER HEALTH DEPARTMENT*

AB-2R

LOG OF AB-2R

Client: Hess	Incident # n/a	Depth to Water (ft. from measuring pt.)	Site Elevation Datum
Site Name: Port Reading	Address: 750 Cliff Rd., Port Reading, NJ	Date: 10/9/2008 — DTW: 3'	Ground Elevation: Not Surveyed
Drilling Company: Summit Drilling		- / -	
Date Started: 10/9/08	Date Completed: 10/9/08 — Well Diameter: 4"		Measuring Point Elevation
Completion Depth: 20'	Hydrogeologist/Engineer: Philip Allegro/EnviroTrac	Permit #: n/a	

SOIL BORING AB-2R (Not To Scale)	DEPTH (ft. below grade)	SAMPLES: Sample ID	SAMPLES: Collection Depth	SAMPLES: OVM (ppm)	SOIL DESCRIPTION
	0				
	1				0-7' - Coarse to Fine Sand, Silt
	2				
	3				
	4				
	5				
	6				
	7				7'-9' - Light Brown to Orange Brown Coarse to Fine Sand, Trace Silt
	8				
	9				
	10				9'-11' - Grey Coarse to Fine Sand, Trace Silt with Fine Gravel
	11				
	12				11'-13' - Dark Grey to Greenish Grey Coarse to Fine Sand, Little Fine Gravel, Little Silt
	13				
	14				
	15				
	16				13'-20' - Grey Coarse to Fine Sand, Trace Silt, Brown Sand, Organic Material
	17				
	18				
	19				
	20				End of boring at 20'. PVC Screen 1' to 20', Riser - 2.5'

AB2R

MONITORING WELL CERTIFICATION FORM B - LOCATION CERTIFICATION

Name of Owner: **Hess Corporation**

Name of Facility: **Port Reading Refinery**

Location: **750 Cliff Road, Port Reading, New Jersey**

Case Number(s): (UST #, ISRA #, Incident #, or EPA #)

LAND SURVEYOR'S CERTIFICATION
Well Permit Number: **P200800553**
(This number must be permanently affixed to the well casing.)

Owners Well Number (As shown on application or plans): **AB-2R**

Geographic Coordinate NAD 83 (to nearest 1/10 of second):

Longitude: **West 074°14'38.5"** Latitude: **North 40°33'34.9"**

New Jersey State Plane Coordinates NAD 83 to nearest 10 feet:

North 628893.9 **East 563244.5**

Elevation of Top of Inner Casing (cap off) at reference mark (nearest 0.01'):	**10.81'**
Top of Case	**11.02'**
Ground Elevation	**9.1'**

Source of elevation datum (benchmark, number/description and elevation/datum If an on-site datum is used, identify here, assume datum of 100', and give approximated actual elevation.) **Existing Form B for Monitoring Well LS-2. PVC Elevation = 10.70. Local Datum of Hess Refinery.**

Significant observations and notes: ____________________

AUTHENTICATION
I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment

SEAL

James W. Ryckman
PROFESSIONAL LAND SURVEYOR'S SIGNATURE

12-05-08
DATE

James W. Ryckman, PLS License Number 25798
PROFESSIONAL LAND SURVEYOR'S NAME AND LICENSE NUMBER

Boundary Lines, P.A.
PO Box 433, Edison, NJ 08818-0433 732-603-9700
PROFESSIONAL LAND SURVEYOR'S ADDRESS AND PHONE NUMBER

C:\WordDocuments\081101 AB-2R

DWR-138 M
8/00

New Jersey Department of Environmental Protection
Bureau of Water Allocation

AB3

MONITORING WELL RECORD

Well Permit No. 26 - 63928

Atlas Sheet Coordinates [illegible] : [illegible] : [illegible]

OWNER IDENTIFICATION - Owner AMERADA HESS CORP
Address 1 HESS PLAZA
City WOODBRIDGE State NJ Zip Code

WELL LOCATION - If not the same as owner please give address. Owner's Well No. AB3
County MIDDLESEX Municipality WOODBRIDGE TWP Lot No. 2 Block No. [illegible]
Address 750 CLIFF RD

TYPE OF WELL (as per Well Permit Categories) MONITORING
DATE WELL STARTED 4/12/02
DATE WELL COMPLETED 4/12/02
Regulatory Program Requiring Well
Case I.D.#

CONSULTING FIRM/FIELD SUPERVISOR (if applicable) Amerada Hess Corporation Tele. #

WELL CONSTRUCTION

Total depth drilled 10' ft.
Well finished to 10' ft.

Borehole diameter:
Top 12" in.
Bottom 12" in.

Well was finished: [X] above grade
[ ] flush mounted

If finished above grade, casing height (stick up) above land surface 3' ft.

Steel protective casing installed?
[X] Yes [ ] No

Static water level after drilling 5' ft.

Water level was measured using Tape

Well was developed for 1/2 hours at 1/2 gpm

Method of development pump

Was permanent pumping equipment installed? [ ] Yes [X] No

Pump capacity ______ gpm

Pump type:

Drilling Fluid ______ Type of Rig B-59

Health and Safety Plan submitted? [X] Yes [ ] No

Level of Protection used on site (circle one) None D C B A

Note: Measure all depths from land surface	Depth to Top (ft.)	Depth to Bottom (ft.)	Diameter (inches)	Material	Wgt./Rating (lbs/sch no.)
Single/Inner Casing	+3'	2'	4"	PVC	sch 40
Middle Casing (for triple cased wells only)					
Outer Casing (largest diameter)					
Open Hole or Screen (No. Used)	2'	10'	4"	PVC	.010 sch 40
Blank Casings (No. Used)					
Tail Piece					
Gravel Pack	1'	10'		Morie #2	
Grout	0'	1'		Neat Cement Bentonite	94 lbs. 5 lbs.

Grouting Method gravity
Drilling Method Auger

GEOLOGIC LOG

Note each depth where water was encountered in consolidated formations.

See Attached

I certify that I have constructed the above referenced well in accordance with all well permit requirements and applicable State rules and regulations.

Drilling Company SUMMIT WELL DRILLING CO INC

Well Driller (Print) John Murtha

Driller's Signature John Murtha

Registration No. J21245 Date 5/15/02

AS-BUILT WELL LOCATION
(NAD 83 HORIZONTAL DATUM)
NJ STATE PLANE COORDINATE IN US SURVEY FEET

NORTHING: ________ EASTING: ________
OR
LATITUDE: __ ° __ ' __ . _ " LONGITUDE: __ ° __ ' __ . _ "

COPIES: White - DEP Canary - Driller Pink - Owner Goldenrod - Health Dept.

AB3

Summit Drilling Co., Inc.
Environmental Specialists

Chimney Rock Road, Bldg. 9W
Bound Brook, NJ 08805
Telephone: (908) 722-4266
Toll Free: (800) 242-6648
FAX: (732) 356-1009
http://www.summitdrilling.com
email: info@summitdrilling.com

WELL LOG

WELL: AB3 DATE DRILLED: 04/12/2002 COORD #1: 26.31.926 PERMIT #1: 26-63928
COORD #2: PERMIT #2:
SITE: Port Reading Refinery, , 750 Cliff Road, Port Reading, NJ 07064-0000 COUNTY: Middlesex
OWNER: Amerada Hess Corporation, P.O. Box 500, 1 Hess Plaza, WB 6, Woodbridge, NJ 07095 XSTREET: Port Reading Avenue
USE: Monitor

INNER CASING: PVC
DIAMETER: 4"
LENGTH: 5'

OUTER CASING:
DIAMETER:
LENGTH:

SCREEN TYPE 1: PVC
SCREEN TYPE 2:
DIAMETER: 4"
LENGTH 1: 8'
LENGTH 2:
SLOT SIZE: .010

DRILLING METHOD: Auger
SAMPLING METHOD:
HOLE DIA: 12", 12"
TOTAL DEPTH: 10'

SET WELL: 10'
GRAVEL PK SZ: Morie #2
DRILLER: John Murtha
SURFACE COMPLETION: S

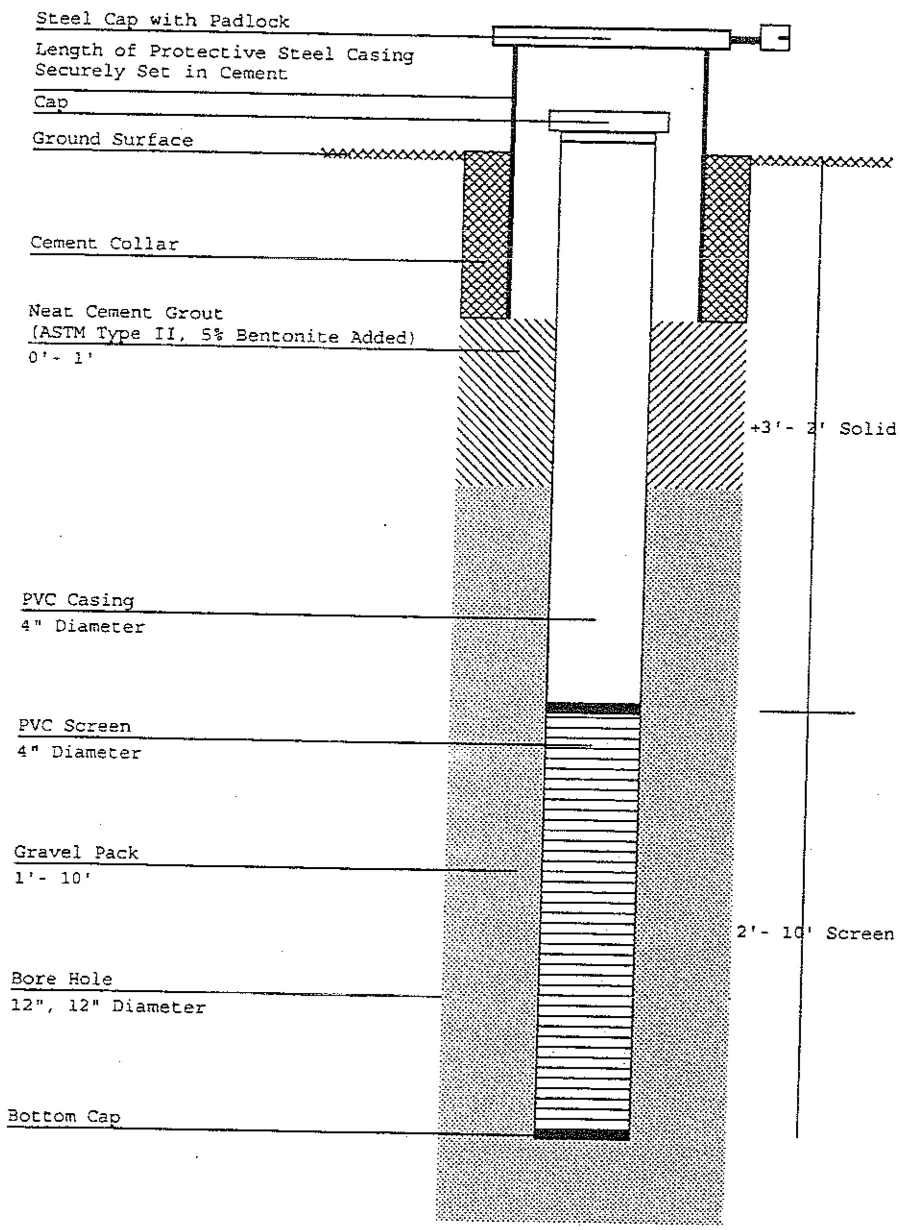
GAL PER MIN: 1/2
STAT H2O LVL: 5'
DEVELOPMENT METHOD: pump
DEVELOPMENT TIME: 1/2

CASING SEAL: Portland
OPEN HOLE:

DEPTH BELOW SURFACE FROM - TO	BLOWS PER 6" ON SAMPLER
-	

REMARKS / SOILS IDENTIFICATION

0'- 5' Fill.
5'- 10' Grey silty sand.



MONITORING WELL LOG

Project Name: Hess Refinery	Well Identification: AB-43
Street Address: Port Reading Refinery	Well Coordinate Number:
Tax Map Address:	Well Permit Number:
County: Middlesex	Latitude: ; Longitude:
Owner: Amerada Hess Corp	Casing Elevation: ; Surface Elevation:
Owner's Representative: Frank Sanclementi, Sr. Hydrogeologist	Well Depth:
Owner's Address: ~~Port Reading~~, NJ 1 Hess Plaza, Woodbridge, NJ	Screen Length: 8 ; Casing Length: 5
GES Project Manager: James Coyne	Drilling Method: Hollow stem
GES Case Manager: John H. Montgomery, P.G.	Well Diameter: 4"
NJDEP Case Number:	Borehole Diameter: 11.0 inches
NJPDES Permit Number:	Sampling Method: Continuous split spoons
Driller: Summit Drilling Co.	Static Water Depth:
Driller's Address: Chimney Rock Rd., Bldg 9W Bound Brook, NJ	Logged By: John H. Montgomery, P.G.
Driller's License Number:	Completion Date:

Depth (feet)	Sample Number	Well Detail	PID (units)	Blow Count Recovery (inches)	Depth (feet)	Lithology/Remarks (Modified Burmister Classification)
						Previously cleared w/ air knife to 5' bgs
5			0	1,1,5,8 4.0		20" Fallback. 6.67-7.0': Brownish-gray to olive-brown M-F Sand, trace(-) organics (peat?) Saturated w/ water
7			0	1,3,2,3 12		12" Fall back 6-7': Brownish-green to brownish-gray M-F Sand, some (+) silt, trace (+) clay
9			2.8-4.9	1,3,2,1 11"		13" Fallback Bottom 9": Dk brownish-black to black peat layer w/ some sheens (iridescent) Sweet-like organic odor observed. PID readings of peat layer ranged from 2.8-4.9 ppm units. Overlying peat layer is 2" of brownish-gray M-VF Sand, some (+) silt, little clay.
						Drilled to 10' bgs. Well constructed using 8' Sch. 40 0.010-slotted screen. Set #1 Sand to 1' above screen. No. 0 Sand to ~ 6" bgs. Set 6" diameter outer steel casing into concrete pad (2x2-foot) & 6" concrete overlying No. 0 Sand. ~~Installed 6~~

MONITORING WELL CERTIFICATION FORM B - LOCATION CERTIFICATION

Name of Owner: HESS CORPORATION

Name of Facility: PORT READING REFINERY

Location: 750 CLIFF RD. PORT READING (WOODBRIDGE) NJ

Case Number(s): ______________________________ (UST #, ISRA #, Incident #, or EPA #)

LAND SURVEYOR'S CERTIFICATION

Well Permit Number: __ __ - __ __ __ __ __ __ - __

(This number must be permanently affixed to the well casing.)

Owners Well Number (As shown on application or plans): AB-3

Geographic Coordinate NAD 83 (to nearest 1/10 of second):

Longitude: West 74 14' 49.29" **Latitude:** North 40 33' 37.66"

New Jersey State Plane Coordinates NAD 83 to nearest 10 feet:

North 629,173 East 562,409

Elevation of Top of Inner Casing (cap off) at reference mark (nearest 0.01'): 14.62

Source of elevation datum (benchmark, number/description and elevation/datum. If an on-site datum is used, identify here, assume datum of 100', and give approximated actual elevation.)

NGVD 1929 DATUM REFERENCE MONUMENT USC&GS # 350 ELEVATION 15.76

Significant observations and notes: ______________________________

____

AUTHENTICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

SEAL

Nancy J. Scott

PROFESSIONAL LAND SURVEYOR'S SIGNATURE

FEB. 4, 2013
DATE

NANCY J. SCOTT, P.L.S. NJ License No. GS 35875

ENSURPLAN, INC. P.O Box 4304 Warren, NJ 07059 732-469-0400

PROFESSIONAL LAND SURVEYOR'S ADDRESS AND PHONE NUMBER

DWR-138 M
8/00

AB4

New Jersey Department of Environmental Protection
Bureau of Water Allocation

MONITORING WELL RECORD

Well Permit No. 26-[illegible] 63929

Atlas Sheet Coordinates 26 : 31 : [illegible]

OWNER IDENTIFICATION - Owner AMERADA HESS CORP
Address 1 HESS PLAZA
City WOODBRIDGE State NJ Zip Code ______

WELL LOCATION - If not the same as owner please give address. Owner's Well No. AB4
County MIDDLESEX Municipality WOODBRIDGE TWP Lot No. 2 Block No. [illegible]605
Address [illegible]50 CLIFF RD

TYPE OF WELL (as per Well Permit Categories) MONITORING
DATE WELL STARTED 4/ 12/ 02
DATE WELL COMPLETED 4/ 12/ 02
Regulatory Program Requiring Well ______ Case I.D.# ______

CONSULTING FIRM/FIELD SUPERVISOR (if applicable) Amerada Hess Corporation Tele. # ______

WELL CONSTRUCTION

Total depth drilled 10' ft.
Well finished to 10' ft.

Borehole diameter:
Top 12" in.
Bottom 12" in.

Well was finished: ☒ above grade ☐ flush mounted

If finished above grade, casing height (stick up) above land surface 3' ft.

Steel protective casing installed? ☒ Yes ☐ No

Static water level after drilling 5' ft.

Water level was measured using Tape

Well was developed for 1/2 hours at 1/2 gpm

Method of development pump

Was permanent pumping equipment installed? ☐ Yes ☒ No

Pump capacity ______ gpm

Pump type: ______

Drilling Fluid ______ Type of Rig B-59

Health and Safety Plan submitted? ☒ Yes ☐ No

Level of Protection used on site (circle one) None D C B A

Note: Measure all depths from land surface	Depth to Top (ft.)	Depth to Bottom (ft.)	Diameter (inches)	Material	Wgt./Rating (lbs/sch no.)
Single/Inner Casing	+3'	2'	4"	PVC	sch 40
Middle Casing (for triple cased wells only)					
Outer Casing (largest diameter)					
Open Hole or Screen (No. Used)	2'	10'	4"	PVC	.010 sch 40
Blank Casings (No. Used)					
Tail Piece					
Gravel Pack	1'	10'		Morie #2	
Grout	0'	1'		Neat Cement Bentonite	94 lbs. 5 lbs.

Grouting Method gravity
Drilling Method Auger

GEOLOGIC LOG

Note each depth where water was encountered in consolidated formations.

See Attached

I certify that I have constructed the above referenced well in accordance with all well permit requirements and applicable State rules and regulations.

Drilling Company SUMMIT WELL DRILLING CO INC

Well Driller (Print) John Murtha

Driller's Signature John Murtha

Registration No. J21245 Date 5 / 15 / 02

AS-BUILT WELL LOCATION
(NAD 83 HORIZONTAL DATUM)
NJ STATE PLANE COORDINATE IN US SURVEY FEET

NORTHING: ______ EASTING: ______
OR
LATITUDE: __ ° __ ' __ . __ " LONGITUDE: __ ° __ ' __ . __ "

COPIES: White - DEP Canary - Driller Pink - Owner Goldenrod - Health Dept.

AB4

Summit® DRILLING CO., INC.
ENVIRONMENTAL SPECIALISTS

Chimney Rock Road, Bldg. 9W
Bound Brook, NJ 08805
Telephone: (908) 722-4266
Toll Free: (800) 242-6648
FAX: (732) 356-1009
http://www.summitdrilling.com
email: info@summitdrilling.com

WELL LOG

WELL: AB4 DATE DRILLED: 04/12/2002 COORD #1: 26.31.926 PERMIT #1: 26-63929
COORD #2: PERMIT #2:
SITE: Port Reading Refinery, , 750 Cliff Road, Port Reading, NJ 07064-0000 COUNTY: Middlesex
OWNER: Amerada Hess Corporation, P.O. Box 500, 1 Hess Plaza, WB 6, Woodbridge, NJ 07095 XSTREET: Port Reading Avenue
USE: Monitor

INNER CASING: PVC
DIAMETER: 4"
LENGTH: 5'

OUTER CASING:
DIAMETER:
LENGTH:

SCREEN TYPE 1: PVC
SCREEN TYPE 2:
DIAMETER: 4"
LENGTH 1: 8'
LENGTH 2:
SLOT SIZE: .010

DRILLING METHOD: Auger
SAMPLING METHOD:
HOLE DIA: 12", 12"
TOTAL DEPTH: 10'

SET WELL: 10'
GRAVEL PK SZ: Morie #2
DRILLER: John Murtha
SURFACE COMPLETION: S

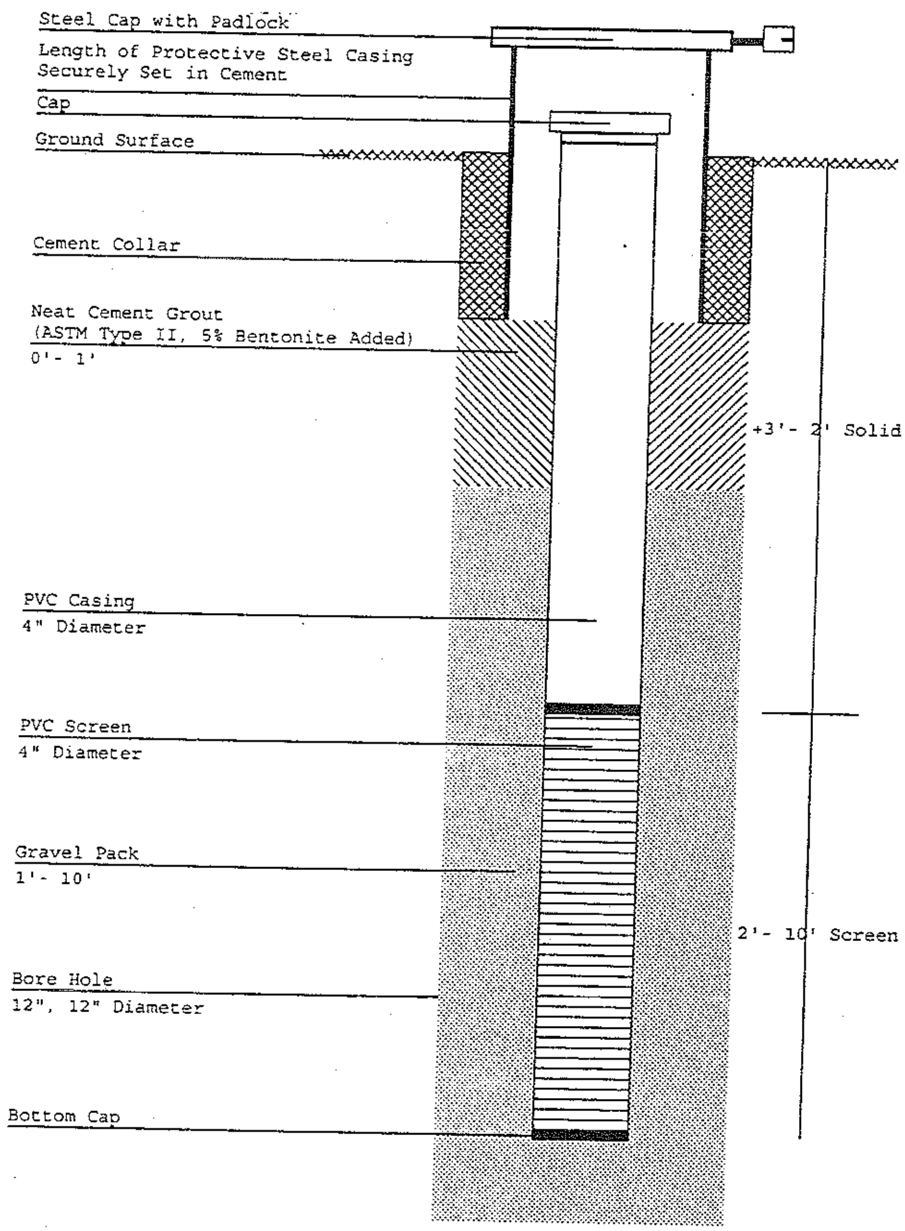
GAL PER MIN: 1/2
STAT H2O LVL: 5'
DEVELOPMENT METHOD: pump
DEVELOPMENT TIME: 1/2

CASING SEAL: Portland
OPEN HOLE:

DEPTH BELOW SURFACE FROM - TO	BLOWS PER 6" ON SAMPLER
-	

REMARKS / SOILS IDENTIFICATION

0'- 5' Fill.
5'- 10' Grey silty sand.



MONITORING WELL LOG

Project Name: Hess - Refinery
Street Address: Port Reading Refinery
Tax Map Address: Port Reading, NJ
County: Middlesex
Owner: Amerada Hess Corporation
Owner's Representative: Frank Sanclementi, Sr. Hydrogeologist
Owner's Address: ~~Port Reading, NJ~~ 1 Hess Plaza, Woodbridge, NJ
GES Project Manager: James Coyne
GES Case Manager: John H. Montgomery, P.G.
NJDEP Case Number:
NJPDES Permit Number:
Driller: Summit Drilling Co.
Driller's Address: Chimney Rock Rd., Bldg 9W, Bound Brook, NJ
Driller's License Number:

Well Identification: AB-4
Well Coordinate Number:
Well Permit Number:
Latitude: ; Longitude:
Casing Elevation: ; Surface Elevation:
Well Depth:
Screen Length: 8 ; Casing Length: 5
Drilling Method: Hollow stem
Well Diameter: 4"
Borehole Diameter: 11.0 inches
Sampling Method: Continuous split-spoons
Static Water Depth:
Logged By: John H. Montgomery, P.G.
Completion Date: 4/12/02

Depth (feet)	Sample Number	Well Detail	PID (units)	Blow Count Recovery (inches)	Depth (feet)	Lithology/Remarks (Modified Burmister Classification)
						Previously cleared w/ air knife & vactron to 5' bgs
						Fallback 10"
5			0	2,4,16,3 13"		Dk greenish black silty clay. Saturated w/ water Semi-plastic
7			0	101,37,36,4 4"		Blackened wood fragments - No odor or PID readings. Fall back is 4" Wood fragments observed in entire spoon. Slight sheen observed. Saturated w/ water.
9			0	8,12,16,18 14"		8.25-9.0': Dk grayish-black, dense, stiff clay w/ some iron mottling & mica fragments trace (+) F-VF sand. 7.9-8.25': Black wood fragments
						Drilled to 10' bgs. Well constructed using 8' Sch. 40 0.010 factory-slotted screen and 5.0' solid riser. Set No. 1 sand to 1' above well screen then No. 0 sand added to ~0.5' bgs. Added concrete to surface. Surface completed w/ concrete in 2x2-foot pad. Installed 6-inch diameter steel outer casing to ~1.5' bgs.

MONITORING WELL CERTIFICATION FORM B - LOCATION CERTIFICATION

Name of Owner: HESS CORPORATION

Name of Facility: PORT READING REFINERY

Location: 750 CLIFF RD. PORT READING (WOODBRIDGE) NJ

Case Number(s): ______________________________ (UST #, ISRA #, Incident #, or EPA #)

LAND SURVEYOR'S CERTIFICATION

Well Permit Number: __ __ - __ __ __ __ __ __ - __
(This number must be permanently affixed to the well casing.)

Owners Well Number (As shown on application or plans): AB-4

Geographic Coordinate NAD 83 (to nearest 1/10 of second):

Longitude: West 74 14' 50.54" **Latitude:** North 40 33' 35.84"

New Jersey State Plane Coordinates NAD 83 to nearest 10 feet:

North 628,988 East 562,313

Elevation of Top of Inner Casing (cap off) at reference mark (nearest 0.01'): 14.24

Source of elevation datum (benchmark, number/description and elevation/datum. If an on-site datum is used, identify here, assume datum of 100', and give approximated actual elevation.)

NGVD 1929 DATUM REFERENCE MONUMENT USC&GS # 350 ELEVATION 15.76

Significant observations and notes: ____

____

AUTHENTICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

SEAL

Nancy J. Scott

PROFESSIONAL LAND SURVEYOR'S SIGNATURE — FEB. 4, 2013 DATE

NANCY J. SCOTT, P.L.S. NJ License No. GS 35875

ENSURPLAN, INC. P.O Box 4304 Warren, NJ 07059 732-469-0400

PROFESSIONAL LAND SURVEYOR'S ADDRESS AND PHONE NUMBER

AB4

MONITORING WELL CERTIFICATION FORM B - LOCATION CERTIFICATION

Name of Owner: Amerada Hess Corporation

Name of Facility: Port Reading Refinery

Location: West Avenue, Port Reading, (Woodbridge Township), NJ

Case Number(s): ______________ (UST #, ISRA #, Incident #, or EPA #)

LAND SURVEYOR'S CERTIFICATION

Well Permit Number: __ __ - __ __ __ __ __ - __

(This number must be permanently affixed to the well casing.)

Owners Well Number (As shown on application or plans): AB4

Geographic Coordinate NAD 83 (to nearest 1/10 of second):

Longitude: West 74° 14' 52.0" Latitude: North 40° 33' 35.4"

New Jersey State Plane Coordinates NAD 83 to nearest 10 feet:

North 628950.955 East 562199.813

Elevation of Top of Inner Casing (cap off) at reference mark (nearest 0.01'): 14.24

Source of elevation datum (benchmark, number/description and elevation/datum. If an on-site datum is used, identify here, assume datum of 100', and give approximated actual elevation.)

U.S.C. & G.S. Monument No. 350 - Elevation 15.76

Significant observations and notes: ______________

AUTHENTICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

SEAL

[signature] 7-01-2002

PROFESSIONAL LAND SURVEYOR'S SIGNATURE DATE

William N. Scott, PLS New Jersey License No. 17421

PROFESSIONAL LAND SURVEYOR'S NAME AND LICENSE NUMBER
(Please print or type)

ENSURPLAN, INC.
P.O. BOX 4304, Warren, NJ 07059 (908-668-7701

New Jersey State Department of Environmental Protection
Bureau of Water Allocation and Well Permitting
Mail Code 401-03 PO BOX 420 Trenton, NJ 08625-0420 Tel: 609-984-6831

Well Permit Number
E201309746

WELL PERMIT

The New Jersey Department of Environmental Protection grants this permit in accordance with your application, attachments accompanying same application, and applicable laws and regulations. This permit is also subject to further conditions and stipulations enumerated in the supporting documents which are agreed to by the permittee upon acceptance of the permit

Certifying Driller: DERMOT P DILLON, MASTER LICENSE # 0001602

Permit Issued to: SUMMIT DRILLING CO INC

Company Address: CENTRAL JERSEY INDUSTRIAL PARK 81A CHIMNEY ROCK RD BOUND BROOK, NJ 08805

PROPERTY OWNER

Name: N/A HESS CORP

Organization: HESS CORPORATION

Address: ONE HESS PLAZA

City: Woodbridge State: New Jersey Zip Code: 07095

PROPOSED WELL LOCATION

Facility Name: HESS PORT READING TERMINAL

Address: 750 CLIFF ROAD REMAIN AS IS AS PER DERMOT DILLON

County: Middlesex Municipality: Woodbridge Twp Lot: 6 Block: 760

Easting (X): 562297 Northing (Y): 628995
Coordinate System: NJ State Plane (NAD83) - USFEET

Local ID: AB-4D

SITE CHARACTERISTICS

PROPOSED CONSTRUCTION

WELL USE: MONITORING

Other Use(s):

Diameter (in.): 4

Regulatory Program Requiring Wells/Borings:

Depth (ft.): 30

Case ID Number:

Pump Capacity (gpm): 0

Deviation Requested: N

Drilling Method: Hollow Stem Augers

Attachments:

SPECIFIC CONDITIONS/REQUIREMENTS

Approval Date: July 16, 2013
Expiration Date: July 16, 2014

Approved by the authority of:
Bob Martin
Commissioner

Terry D. Pilawski

Terry Pilawski, Chief
Bureau of Water Allocation and Well Permitting

New Jersey State Department of Environmental Protection
Bureau of Water Allocation and Wells
PO BOX 420 Trenton, NJ 08625-0420 Tel: 609-984-6831

Well Permit Number
E201309746

WELL PERMIT

DEVIATION INFORMATION	
Purpose:	
Unusual Conditions:	
Reason for Deviation:	
Proposed Well Construction	

GENERAL CONDITIONS/REQUIREMENTS
A copy of this permit shall be kept at the worksite / on the property and shall be exhibited upon request. [N.J.A.C. 7:9D-1]
A well record must be submitted by the well driller to the Bureau of Water Systems and Well Permitting. Unless prior written approval is obtained from the Bureau of Water Systems and Well Permitting the well record shall be submitted electronically through the New Jersey Department of Environmental Protection's Regulatory Services Portal Submit Well Record: within ninety (90) days after the well is completed.[N.J.A.C. 7:9D-1]
All well drilling/pump installation activities shall comply with N.J.A.C. 7:9D-1 et seq. [N.J.A.C. 7:9D-1]
For this permit to remain valid, the well approved in this permit shall be constructed within one year of the effective date of the permit. [N.J.A.C. 7:9D-1]
If the pump capacity applied for is less than 70 gpm, no subsequent increase to 70 gpm or more shall be made without prior approval of the Bureau of Water Systems and Well Permitting. [N.J.A.C. 7:9D-1]
If the use of the well is to be changed a well permit for the proposed use of the well shall be submitted for review and approval. [N.J.A.C. 7:9D-1]
If you or a future property owner intend to redesignate this well as a Category 1 well (domestic, non-public, community water supply or public non-community water supply wells), the well must be constructed as a Category 1 well per the Well Construction and Abandonment Regulations at N.J.A.C. 7:0D-1.1 et seq. In addition, if the current or future property owner intends to have this well redesignated as a community water supply well, the well must be constructed by a Master well driller, which would include having a Master well driller on-site at all times during construction of the well, as specified in the Well Construction and Abandonment Regulations. Otherwise, the New Jersey Department of Environmental Protection will not allow the well to be redesignated, and a new well would have to be installed. [N.J.A.C. 7:9D-1.7((a))1i]
In accepting this permit the Property Owner and Driller agree to abide by the following terms and conditions [N.J.A.C. 7:9D-1]
In the event that this well is not constructed the well driller shall notify the Bureau of Water Systems and Well Permitting of the permit cancellation. Unless prior written approval is obtained from the Bureau of Water Systems and Well Permitting the Cancellation notification shall be submitted electronically through the New Jersey Department of Environmental Protection's Regulatory Services Portal Submit Well Permit Cancellation : by the expiration date of this permit.[N.J.A.C. 7:9D-1]
In the event this well is abandoned, the Owner or Well driller shall assume full responsibility for having the well decommissioned in a manner satisfactory to the New Jersey Department of Environmental Protection in accordance with the provisions of N.J.A.C. 7:9D-1 et seq. [N.J.A.C. 7:9D-1]
The granting of this permit shall not be construed in any way to affect the title or ownership of property, and shall not make the New Jersey Department of Environmental Protection or the State a party in any suit or question of ownership of property. [N.J.A.C. 7:9D-1]
The issuance of this permit shall not be deemed to affect in any way action by the New Jersey Department of Environmental Protection on any future application. [N.J.A.C. 7:9D-1]
This permit conveys no rights, either expressed, or implied to divert water. [N.J.A.C. 7:9D-1]
This permit does not waive the obtaining of Federal or other State or local Government consent when necessary. This permit is not valid and no work shall be undertaken until such time as all other required approvals and permits have been obtained. [N.J.A.C. 7:9D-1]
This permit is NONTRANSFERABLE [N.J.A.C. 7:9D]
This well shall not be used for the supply of potable / drinking water. [N.J.A.C. 7:9D-1]

New Jersey State Department of Environmental Protection
Bureau of Water Allocation and Well Permitting
Mail Code 401-03 PO BOX 420 Trenton, NJ 08625-0420 Tel: 609-984-6831

Well Permit Number
E201309746

MONITORING WELL RECORD

PROPERTY OWNER: N/A HESS CORP

Company/Organization: HESS CORPORATION

Address: ONE HESS PLAZA Woodbridge, New Jersey 07095

WELL LOCATION: HESS PORT READING TERMINAL

Address: 750 CLIFF ROAD REMAIN AS IS AS PER DERMOT DILLON

County: Middlesex Municipality: Woodbridge Twp Lot: 6 Block: 760

Easting (X): 562310 Northing (Y): 628990
Coordinate System: NJ State Plane (NAD83) - USFEET

DATE WELL STARTED: July 22, 2013

DATE WELL COMPLETED: July 22, 2013

WELL USE: MONITORING

Other Use(s):

Local ID: AB-4D

WELL CONSTRUCTION

Total Depth Drilled (ft.): 30 Finished Well Depth (ft.): 30 Well Surface: Above Grade

	Depth to Top (ft.)	Depth to Bottom (ft.)	Diameter (inches)	Material	Wgt/Rating/Screen # Used (lbs/ch no.)
Borehole	0	30	8		
Casing	0	25	4	PVC	sch40
Screen	25	30	4	pvc	.010

	Depth to Top (ft.)	Depth to Bottom (ft.)	Outer Diameter (in.)	Inner Diameter (in)	Material		
					Bentonite (lbs.)	Neat Cement (lbs.)	Water (gal.)
Grout	0	23	8	4	25	470	40
Gravel Pack	23	30	8	4	#1 morrie		

Grouting Method: Pressure method (Tremie Pipe) Drilling Method: Hollow Stem Augers

ADDITIONAL INFORMATION

Protective Casing: Yes
Static Water Level: 6 ft. below land surface
Water Level Measure Tool: M Scope
Well Development Period: .5 hrs.
Method of Development: submersible pump
Pump Type:

Pump Capacity: _ gpm
Total Design Head: _ ft.
Drilling Fluid:
Drill Rig: cme-75
Health and Safety Plan Submitted? Yes

ATTACHMENTS:

GEOLOGIC LOG
0 - 5: brown OT - Other fill
5 - 14: brown OT - Other silt, mf sand
14 - 25: brown grey OT - Other clay, trace organics
25 - 30: tan brown OT - Other mf sand, gravel

ADDITIONAL INFORMATION:

Driller of Record: Michael Wilson, MONITORING LICENSE # 510603 Company: SUMMIT DRILLING CO INC

AB-4D

Client:	Incident #	Depth to Water	Site Elevation Datum
Hess Corporation		~10'	Ground Elevation

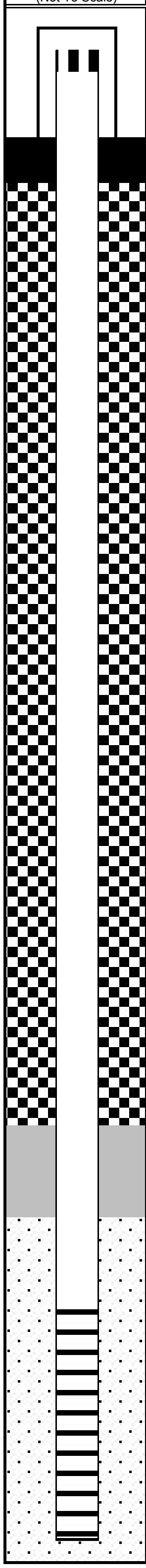
Site Name:	Address:	Date	DTW
Port Reading	750 Cliff Road, Port Reading, NJ		

Drilling Company:			Measuring Point Elevation
Summit Drilling Co., Inc.			11.80'

Date Started:	Date Completed:	Well Diameter
7/16/2013	7/19/2013	4"

Completion Depth:	Hydrogeologist/Engineer	Permit #:
30.0'	Sarah Dyson/EnviroTrac Ltd.	E201309746

SOIL BORING AB-4D (Not To Scale)



DEPTH (ft. below grade)	SAMPLES Sample ID	Collection Depth	PID (ppm)	SOIL DESCRIPTION
3	NA	NA		
				+3.0-0.0 Protective Steel Casing (Stickup)
2				
1				
0				
				0.0-0.5 ROADSTONE/Gravel (Handcleared to 6.0')
				0.5-3.0 Brown fine SAND, trace Silt
1				
			0.0	
2				
			0.0	
3				
			0.0	3.0-4.0 Brown, some yellow fine SAND, trace Silt
4				
			0.0	4.0-5.5 Greyish brown fine SAND, some Clay
5				
			0.0	5.5-8.0 Dark grey Sandy CLAY
6				
7				
8				
				8.0-8.5 WOOD
				8.5-12.0 Dark grey Sandy CLAY
9				
10				
11				
12				
				12.0-13.5 No Recovery (loosely consolidated)
13				
			0.0	13.5-14.0 Brown SAND with coarse Gravel
14				
				14.0-15.5 No Recovery
15				
			0.0	15.5-16.0 Dark grey CLAY with wood fragments, trace Peat
16				
			0.0	16.0-18.0 Dark grey CLAY
			0.0	
17				
			0.0	
			0.0	
18				
				18.0-19.0 No Recovery
19				
			0.0	19.0-24.0 Dark grey CLAY, some Peat
			0.0	
20				
			0.0	
			0.0	
21				
			0.0	
			0.0	
22				
			0.0	
			0.0	
23				
			0.0	
			0.0	
24				
				24.0-25.5 No Recovery
25				
			0.0	25.5-26.0 Dark grey Sandy CLAY
26				
				26.0-27.0 No Recovery
27				
			0.0	27.0-28.0 Dark grey CLAY
			0.0	
28				
			0.0	28.0-29.0 Dark grey CLAY and fine Gravel
			0.0	
29				
			0.0	29.0-30.0 Brownish grey fine SAND
			0.0	
30				

Cement
Morie Sand
PVC Riser
PVC Screen
Grout
Bentonite Seal

New Jersey Department of Environmental Protection
Site Remediation Program

Monitoring Well Certification Form B - Location Certification

Date Stamp
(For Department use only)

SECTION A. SITE NAME AND LOCATION

Site Name: Hess Port Reading Refinery

List all AKAs: N/A

Street Address: 750 Cliff Road

Municipality: Woodbridge Township (Township, Borough or City)

County: Middlesex Zip Code: 07095

Program Interest (PI) Number(s): N/A Case Tracking Number(s): 93-10-21-1435-21

SECTION B. WELL OWNER AND LOCATION

1. Name of Well Owner Hess Corporation
2. Well Location (Street Address) 750 Cliff Road, Woodbridge Township, NJ 07095
3. Well Location (Municpal Block and Lot) Block# 760 Lot # 6

SECTION C. WELL LOCATION SPECIFICS

1. Well Permit Number (This number must be permanently affixed to the well casing): E201309746
2. Site Well Number As shown on application or plans): AB-4D
3. Geographic Coordinate NAD 83 to nearest 1/10 of a second:

   Longitude: West 74°14'50.5" Latitude: North 40°33'35.9"

4. New Jersey State Plane Coordinates NAD 83 to nearest 10 feet:

   North 628990 East 562310

5. Elevation of Top of Inner Casing (cap off) at reference mark (nearest 0.01'): .... 11.80'
6. Source of elevation datum (benchmark, number/description and elevation/datum. If an on-site datum is used, identify here, assume datum of 100', and give approximated actual elevation.)

   NAVD 88 From GPS

7. Significant observations and notes:

   N/A

SECTION D. LAND SURVEYOR'S CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

SEAL

Professional Land Surveyor's Signature: [signature] Date 8/29/13

Surveyor's Name: Donald L. MacKay License Number: 24GS03127100

Mailing Address Taylor, Wiseman & Taylor, 124 Gaither Drive, Suite 150

City/Town: Mount Laurel State New Jersey Zip Code: 08054

Phone Number 856-235-7200 Ext.: 1124 Fax: 856-722-9250

DWR-138 M
8/00

New Jersey Department of Environmental Protection
Bureau of Water Allocation

AB5

MONITORING WELL RECORD

Well Permit No. 26-63930

Atlas Sheet Coordinates

OWNER IDENTIFICATION - Owner AMERADA HESS CORP
Address 1 HESS PLAZA
City WOODBRIDGE State NJ Zip Code

WELL LOCATION - If not the same as owner please give address. Owner's Well No. AB5
County MIDDLESEX Municipality WOODBRIDGE TWP Lot No. Block No.
Address

TYPE OF WELL (as per Well Permit Categories) MONITORING
DATE WELL STARTED 4/ 12/ 02
DATE WELL COMPLETED 4/ 12/ 02
Regulatory Program Requiring Well Case I.D.#

CONSULTING FIRM/FIELD SUPERVISOR (if applicable) Amerada Hess Corporation Tele. #

WELL CONSTRUCTION

Total depth drilled 10' ft.
Well finished to 10' ft.

Borehole diameter:
Top 12" in.
Bottom 12" in.

Well was finished: [X] above grade [ ] flush mounted

If finished above grade, casing height (stick up) above land surface 3' ft.

Steel protective casing installed? [X] Yes [ ] No

Static water level after drilling 5' ft.
Water level was measured using Tape
Well was developed for 1/2 hours at 1/2 gpm

Note: Measure all depths from land surface	Depth to Top (ft.)	Depth to Bottom (ft.)	Diameter (inches)	Material	Wgt./Rating (lbs/sch no.)
Single/Inner Casing	+3'	2'	4"	PVC	sch 40
Middle Casing (for triple cased wells only)					
Outer Casing (largest diameter)					
Open Hole or Screen (No. Used)	2'	10'	4"	PVC	.010 sch 40
Blank Casings (No. Used)					
Tail Piece					
Gravel Pack	1'	10'		Morie #2	
Grout	0'	1'		Neat Cement Bentonite	94 lbs. 5 lbs.

Grouting Method gravity
Drilling Method Auger

Method of development pump
Was permanent pumping equipment installed? [ ] Yes [X] No
Pump capacity gpm
Pump type:
Drilling Fluid Type of Rig B-59
Health and Safety Plan submitted? [X] Yes [ ] No
Level of Protection used on site (circle one) None D C B A

I certify that I have constructed the above referenced well in accordance with all well permit requirements and applicable State rules and regulations.

Drilling Company SUMMIT WELL DRILLING CO INC
Well Driller (Print) John Murtha
Driller's Signature John Murtha
Registration No. J21245 Date 5 / 15 / 02

GEOLOGIC LOG

Note each depth where water was encountered in consolidated formations.

See Attached

AS-BUILT WELL LOCATION
(NAD 83 HORIZONTAL DATUM)
NJ STATE PLANE COORDINATE IN US SURVEY FEET

NORTHING: ______ EASTING: ______
OR
LATITUDE: __ ° __ ' __ . __ " LONGITUDE: __ ° __ ' __ . __ "

COPIES: White - DEP Canary - Driller Pink - Owner Goldenrod - Health Dept.

AB5

Summit DRILLING CO., INC.
ENVIRONMENTAL SPECIALISTS

Chimney Rock Road, Bldg. 9W
Bound Brook, NJ 08805
Telephone: (908) 722-4266
Toll Free: (800) 242-6648
FAX: (732) 356-1009
http://www.summitdrilling.com
email: info@summitdrilling.com

WELL LOG

WELL: AB5 DATE DRILLED: 04/12/2002 COORD #1: 26.31.926 PERMIT #1: 26-63930
COORD #2: PERMIT #2:
SITE: Port Reading Refinery, , 750 Cliff Road, Port Reading, NJ 07064-0000 COUNTY: Middlesex
OWNER: Amerada Hess Corporation, P.O. Box 500, 1 Hess Plaza, WB 6, Woodbridge, NJ 07095 XSTREET: Port Reading Avenue
USE: Monitor

INNER CASING: PVC
DIAMETER: 4"
LENGTH: 5'

OUTER CASING:
DIAMETER:
LENGTH:

SCREEN TYPE 1: PVC
SCREEN TYPE 2:
DIAMETER: 4"
LENGTH 1: 8'
LENGTH 2:
SLOT SIZE: .010

DRILLING METHOD: Auger
SAMPLING METHOD:
HOLE DIA: 12", 12"
TOTAL DEPTH: 10'

SET WELL: 10'
GRAVEL PK SZ: Morie #2
DRILLER: John Murtha
SURFACE COMPLETION: S

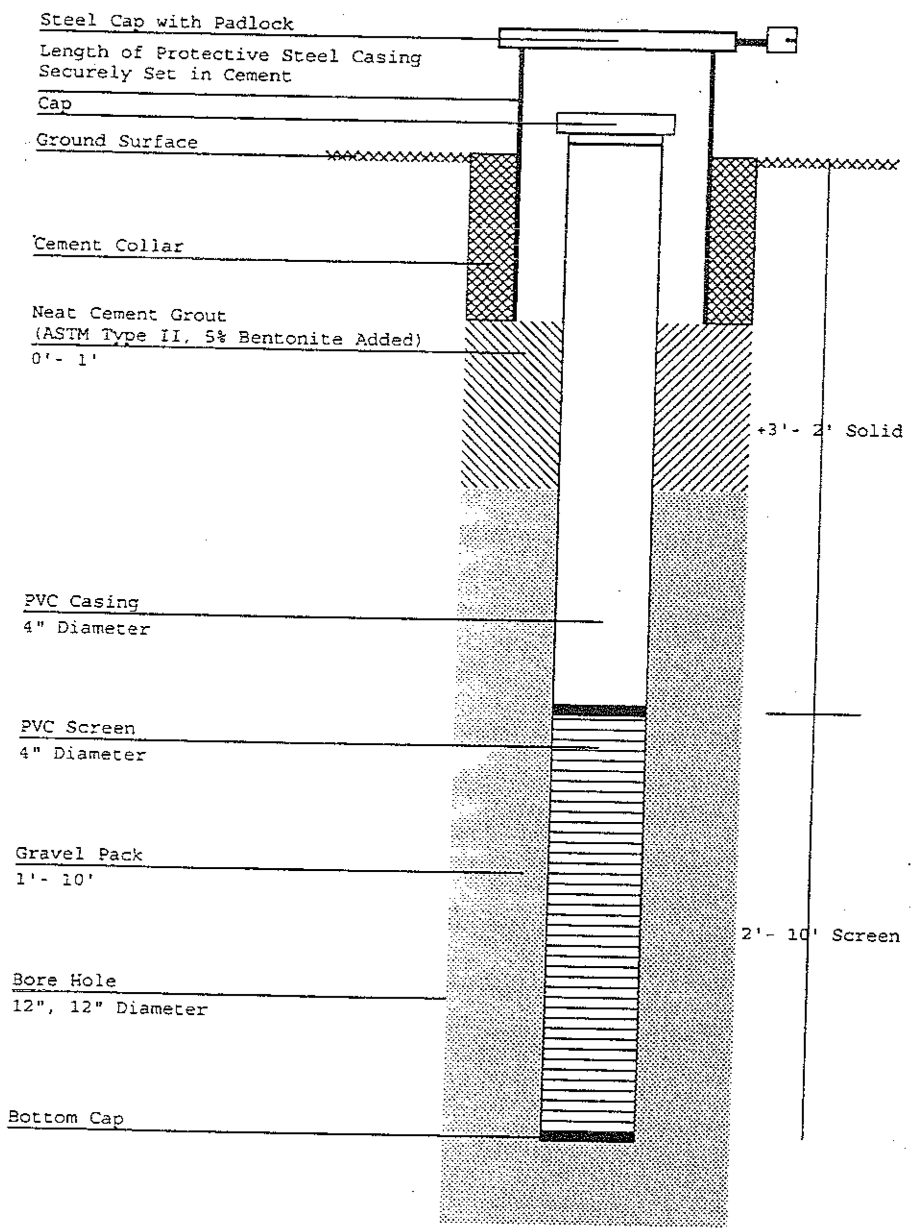
GAL PER MIN: 1/2
STAT H20 LVL: 5'
DEVELOPMENT METHOD: pump
DEVELOPMENT TIME: 1/2

CASING SEAL: Portland
OPEN HOLE:

DEPTH BELOW SURFACE FROM - TO	BLOWS PER 6" ON SAMPLER
-	

REMARKS / SOILS IDENTIFICATION

0'- 5' Fill.
5'- 10' Grey silty sand.



MONITORING WELL LOG

Project Name: Hess - Refinery	**Well Identification:** AB-5
Street Address: Port Reading Refinery	**Well Coordinate Number:**
Tax Map Address: Port Reading, NJ	**Well Permit Number:**
County: Middlesex NJ	**Latitude:** ; **Longitude:**
Owner: Amerada Hess Corporation	**Casing Elevation:** ; **Surface Elevation:**
Owner's Representative: Frank Sanclementi, Sr. Hydrogeologist	**Well Depth:**
Owner's Address: ~~Port Reading, NJ~~ 1 Hess Plaza, Woodbridge, NJ	**Screen Length:** ; **Casing Length:**
GES Project Manager: James Coyne	**Drilling Method:**
GES Case Manager: John H. Montgomery, P.G.	**Well Diameter:**
NJDEP Case Number:	**Borehole Diameter:** 11.0 inches
NJPDES Permit Number:	**Sampling Method:** continuous split spoon
Driller: Summit Drilling Co.	**Static Water Depth:**
Driller's Address: Chimney Rock Rd., Bldg 9W Bound Brook, NJ	**Logged By:** John H. Montgomery, P.G.
Driller's License Number:	**Completion Date:** 4/12/02

Depth (feet)	Sample Number	Well Detail	PID (units)	Blow Count Recovery (inches)	Depth (feet)	Lithology/Remarks (Modified Burmister Classification)
						Previously cleared w/ vactron.
5			0	1,1,1,11 10"		3" Fallback Greenish-gray to brownish-green VF sand, some (+) clay, trace (-) well rounded gravel. Saturated w/ H_2O. Grading coarser w/ depth. Bottom 2": Med to fine orange-brn Sand, little silt.
7				1,5,6,7 8"		Brownish-orange to brn very coarse to med, rounded Sand, some (-) silt, little clay, trace well to semi-rounded qtz pebbles. Saturated w/ H_2O.
9				5,1,5,6 4"		Grayish-black to greenish-gray F-VF Sand some (+) silt, trace (-) micaceous specks.
						Drilled to 10' bgs. Well constructed using 4-inch diameter, 8' Sch 40 0.010 factory slotted screen and 5.0' solid riser. Set No. 1 sand to 1' above well screen followed by No 0 sand to ~ 0.5' bgs. Added concrete to surface. Constructed 2x2-foot concrete pad. Set 6-inch diameter outer steel casing to ~ 1.5' bgs.

AB5

MONITORING WELL CERTIFICATION FORM B - LOCATION CERTIFICATION

Name of Owner: Amerada Hess Corporation

Name of Facility: Port Reading Refinery

Location: West Avenue, Port Reading, (Woodbridge Township), NJ

Case Number(s): ________________ (UST #, ISRA #, Incident #, or EPA #)

LAND SURVEYOR'S CERTIFICATION

Well Permit Number: __ __ - __ __ __ __ __ - __

(This number must be permanently affixed to the well casing.)

Owners Well Number (As shown on application or plans): AB 5

Geographic Coordinate NAD 83 (to nearest 1/10 of second):

Longitude: West 74° 14' 51.8" Latitude: North 40° 33' 33.1"

New Jersey State Plane Coordinates NAD 83 to nearest 10 feet:

North 628718.337 East 562215.141

Elevation of Top of Inner Casing (cap off) at reference mark (nearest 0.01'): 13.24

Source of elevation datum (benchmark, number/description and elevation/datum. If an on-site datum is used, identify here, assume datum of 100', and give approximated actual elevation.)

U.S.C. & G.S. Monument No. 350 - Elevation 15.76

Significant observations and notes: ________________

AUTHENTICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

SEAL

William N. Scott

PROFESSIONAL LAND SURVEYOR'S SIGNATURE

7-01-2002

DATE

William N. Scott, PLS New Jersey License No. 17421

PROFESSIONAL LAND SURVEYOR'S NAME AND LICENSE NUMBER
(Please print or type)

ENSURPLAN, INC.
P.O. BOX 4304, Warren, NJ 07059 (908-668-7701

Appendix XVII

Fill Material Documentation

Stavola Companies
P.O. Box 482
Red Bank, NJ 07701
Phone: (732) 542-2328 Fax: (732) 542-2615

INVOICE

Date 07/12/14
Invoice # 259963MB

Stavola Construction Materials
Customer 02705
ENVIROTRAC LTD
ATTN: M. MICELI
400 CORPORATE CT
SUITE E
SO. PLAINFIELD, NJ 07080

Project # 030601
WOODBRIDGE, HESS REFINERY/CLIF
HESS REFINERY
750 CLIFF ROAD
WOODBRIDGE, NJ

PO #

Date	Plant	Ticket Number	Shipping Destination	Zone Code	Tons	Unit Price	Product Amount	Sales Tax	Haulage Rate	Haulage Amount	Ticket Total
		QUARRY PROCESS- QP		0019							
07/07/14	BBQ	01641928	Woodbridge	990	26.98	7.0000	188.86	23.61	5.50	148.39	360.86
07/07/14	BBQ	01641929	Woodbridge	990	23.24	7.0000	162.68	20.34	5.50	127.82	310.84
07/07/14	BBQ	01641933	Woodbridge	990	26.52	7.0000	185.64	23.21	5.50	145.86	354.71
07/07/14	BBQ	01641935	Woodbridge	990	26.90	7.0000	188.30	23.54	5.50	147.95	359.79
07/07/14	BBQ	01641936	Woodbridge	990	26.46	7.0000	185.22	23.15	5.50	145.53	353.90
07/07/14	BBQ	01641943	Woodbridge	990	25.60	7.0000	179.20	22.40	5.50	140.80	342.40
07/07/14	BBQ	01641948	Woodbridge	990	25.92	7.0000	181.44	22.68	5.50	142.56	346.68
07/07/14	BBQ	01641952	Woodbridge	990	26.44	7.0000	185.08	23.14	5.50	145.42	353.64
07/07/14	BBQ	01641953	Woodbridge	990	26.64	7.0000	186.48	23.31	5.50	146.52	356.31
07/07/14	BBQ	01641954	Woodbridge	990	27.30	7.0000	191.10	23.89	5.50	150.15	365.14
07/07/14	BBQ	01641955	Woodbridge	990	25.07	7.0000	175.49	21.94	5.50	137.89	335.32
07/07/14	BBQ	01641959	Woodbridge	990	26.24	7.0000	183.68	22.96	5.50	144.32	350.96
07/07/14	BBQ	01641962	Woodbridge	990	27.09	7.0000	189.63	23.70	5.50	149.00	362.33
07/07/14	BBQ	01641964	Woodbridge	990	26.56	7.0000	185.92	23.24	5.50	146.08	355.24
07/07/14	BBQ	01641973	Woodbridge	990	26.25	7.0000	183.75	22.97	5.50	144.38	351.10
07/07/14	BBQ	01641977	Woodbridge	990	24.84	7.0000	173.88	21.74	5.50	136.62	332.24
07/07/14	BBQ	01641994	Woodbridge	990	27.22	7.0000	190.54	23.82	5.50	149.71	364.07
07/07/14	BBQ	01641995	Woodbridge	990	25.23	7.0000	176.61	22.08	5.50	138.77	337.46
07/07/14	BBQ	01641997	Woodbridge	990	25.93	7.0000	181.51	22.69	5.50	142.62	346.82
07/07/14	BBQ	01641998	Woodbridge	990	26.84	7.0000	187.88	23.49	5.50	147.62	358.99
07/07/14	BBQ	01642000	Woodbridge	990	26.20	7.0000	183.40	22.93	5.50	144.10	350.43
07/07/14	BBQ	01642001	Woodbridge	990	25.01	7.0000	175.07	21.88	5.50	137.56	334.51
07/07/14	BBQ	01642013	Woodbridge	990	26.59	7.0000	186.13	23.27	5.50	146.25	355.65
07/07/14	BBQ	01642017	Woodbridge	990	25.76	7.0000	180.32	22.54	5.50	141.68	344.54
07/07/14	BBQ	01642046	Woodbridge	990	26.15	7.0000	183.05	22.88	5.50	143.83	349.76
07/07/14	BBQ	01642047	Woodbridge	990	24.12	7.0000	168.84	21.11	5.50	132.66	322.61

Total Due $24,408.79

- Continued on the Next Page -

Stavola Companies

P.O. Box 482
Red Bank, NJ 07701
Phone: (732) 542-2328 Fax: (732) 542-2615

INVOICE

Date 07/12/14
Invoice # 259963MB

Stavola Construction Materials
Customer 02705
ENVIROTRAC LTD
ATTN: M. MICELI
400 CORPORATE CT
SUITE E
SO. PLAINFIELD, NJ 07080

Project # 030601
WOODBRIDGE, HESS REFINERY/CLIF
HESS REFINERY
750 CLIFF ROAD
WOODBRIDGE, NJ

PO #

Date	Plant	Ticket Number	Shipping Destination	Zone Code	Tons	Unit Price	Product Amount	Sales Tax	Haulage Rate	Haulage Amount	Ticket Total
07/07/14	BBQ	01642049	Woodbridge	990	26.92	7.0000	188.44	23.56	5.50	148.06	360.06
07/07/14	BBQ	01642054	Woodbridge	990	27.18	7.0000	190.26	23.78	5.50	149.49	363.53
07/07/14	BBQ	01642055	Woodbridge	990	25.63	7.0000	179.41	22.43	5.50	140.97	342.81
07/07/14	BBQ	01642056	Woodbridge	990	25.91	7.0000	181.37	22.67	5.50	142.51	346.55
07/07/14	BBQ	01642057	Woodbridge	990	24.06	7.0000	168.42	21.05	5.50	132.33	321.80
07/07/14	BBQ	01642058	Woodbridge	990	26.42	7.0000	184.94	23.12	5.50	145.31	353.37
07/07/14	BBQ	01642059	Woodbridge	990	26.88	7.0000	188.16	23.52	5.50	147.84	359.52
07/07/14	BBQ	01642061	Woodbridge	990	26.27	7.0000	183.89	22.99	5.50	144.49	351.37
07/07/14	BBQ	01642062	Woodbridge	990	27.60	7.0000	193.20	24.15	5.50	151.80	369.15
07/07/14	BBQ	01642063	Woodbridge	990	25.95	7.0000	181.65	22.71	5.50	142.73	347.09
07/07/14	BBQ	01642065	Woodbridge	990	25.49	7.0000	178.43	22.30	5.50	140.20	340.93
07/07/14	BBQ	01642066	Woodbridge	990	25.93	7.0000	181.51	22.69	5.50	142.62	346.82
07/07/14	BBQ	01642068	Woodbridge	990	25.05	7.0000	175.35	21.92	5.50	137.78	335.05
07/07/14	BBQ	01642069	Woodbridge	990	27.36	7.0000	191.52	23.94	5.50	150.48	365.94
07/07/14	BBQ	01642071	Woodbridge	990	26.18	7.0000	183.26	22.91	5.50	143.99	350.16
07/07/14	BBQ	01642073	Woodbridge	990	26.49	7.0000	185.43	23.18	5.50	145.70	354.31
07/07/14	BBQ	01642099	Woodbridge	990	25.11	7.0000	175.77	21.97	5.50	138.11	335.85
07/07/14	BBQ	01642102	Woodbridge	990	25.68	7.0000	179.76	22.47	5.50	141.24	343.47
07/07/14	BBQ	01642108	Woodbridge	990	26.30	7.0000	184.10	23.01	5.50	144.65	351.76
07/07/14	BBQ	01642109	Woodbridge	990	23.85	7.0000	166.95	20.87	5.50	131.18	319.00
07/07/14	BBQ	01642111	Woodbridge	990	26.78	7.0000	187.46	23.43	5.50	147.29	358.18
07/07/14	BBQ	01642125	Woodbridge	990	26.66	7.0000	186.62	23.33	5.50	146.63	356.58
07/07/14	BBQ	01642129	Woodbridge	990	26.82	7.0000	187.74	23.47	5.50	147.51	358.72
07/07/14	BBQ	01642220	Woodbridge	990	26.90	7.0000	188.30	23.54	5.50	147.95	359.79
07/10/14	BBQ	01643604	Woodbridge	990	24.99	7.0000	174.93	21.87	5.50	137.45	334.25
07/10/14	BBQ	01643605	Woodbridge	990	25.31	7.0000	177.17	22.15	5.50	139.21	338.53
07/10/14	BBQ	01643610	Woodbridge	990	25.90	7.0000	181.30	22.66	5.50	142.45	346.41
07/10/14	BBQ	01643611	Woodbridge	990	26.21	7.0000	183.47	22.93	5.50	144.16	350.56

Total Due $24,408.79

- Continued on the Next Page -

Stavola Companies

P.O. Box 482
Red Bank, NJ 07701
Phone: (732) 542-2328 Fax: (732) 542-2615

INVOICE

Date 07/12/14
Invoice # 259963MB

Stavola Construction Materials
Customer 02705
ENVIROTRAC LTD
ATTN: M. MICELI
400 CORPORATE CT
SUITE E
SO. PLAINFIELD, NJ 07080

Project # 030601
WOODBRIDGE, HESS REFINERY/CLIF
HESS REFINERY
750 CLIFF ROAD
WOODBRIDGE, NJ

PO #

Date	Plant	Ticket Number	Shipping Destination	Zone Code	Tons	Unit Price	Product Amount	Sales Tax	Haulage Rate	Haulage Amount	Ticket Total
07/10/14	BBQ	01643614	Woodbridge	990	25.45	7.0000	178.15	22.27	5.50	139.98	340.40
07/10/14	BBQ	01643618	Woodbridge	990	27.82	7.0000	194.74	24.34	5.50	153.01	372.09
07/10/14	BBQ	01643625	Woodbridge	990	28.15	7.0000	197.05	24.63	5.50	154.83	376.51
07/10/14	BBQ	01643632	Woodbridge	990	26.86	7.0000	188.02	23.50	5.50	147.73	359.25
07/10/14	BBQ	01643636	Woodbridge	990	25.64	7.0000	179.48	22.44	5.50	141.02	342.94
07/10/14	BBQ	01643638	Woodbridge	990	26.67	7.0000	186.69	23.34	5.50	146.69	356.72
07/10/14	BBQ	01643640	Woodbridge	990	24.71	7.0000	172.97	21.62	5.50	135.91	330.50
07/10/14	BBQ	01643645	Woodbridge	990	26.03	7.0000	182.21	22.78	5.50	143.17	348.16
07/10/14	BBQ	01643646	Woodbridge	990	26.51	7.0000	185.57	23.20	5.50	145.81	354.58
07/10/14	BBQ	01643651	Woodbridge	990	25.04	7.0000	175.28	21.91	5.50	137.72	334.91
07/10/14	BBQ	01643652	Woodbridge	990	25.77	7.0000	180.39	22.55	5.50	141.74	344.68
07/10/14	BBQ	01643654	Woodbridge	990	25.94	7.0000	181.58	22.70	5.50	142.67	346.95
07/10/14	BBQ	01643656	Woodbridge	990	24.98	7.0000	174.86	21.86	5.50	137.39	334.11
07/10/14	BBQ	01643657	Woodbridge	990	25.60	7.0000	179.20	22.40	5.50	140.80	342.40
07/10/14	BBQ	01643658	Woodbridge	990	26.30	7.0000	184.10	23.01	5.50	144.65	351.76
07/10/14	BBQ	01643659	Woodbridge	990	26.54	7.0000	185.78	23.22	5.50	145.97	354.97
Subtotal BBQ QUARRY PROCESS- QP				0019	1,824.94 (1,655.56 MG)	7.0000	12,774.58	1,596.90	5.50	10,037.31	24,408.79

B Received NB
EnviroTrac Ltd.
JUL 22 2014
P 08.HSP001.05
T 16 Acct 5100
ST App AJC

TERMS Net 30

Material	$12,774.58
Haulage	10,037.31
Tax	$1,596.90
Receipt Amt	$0.00
Total Due	$24,408.79

Stavola Companies
P.O. Box 482
Red Bank, NJ 07701
Phone: (732) 542-2328 Fax: (732) 542-2615

INVOICE

Date 07/19/14
Invoice # 260569MB

Stavola Construction Materials
Customer 02705
ENVIROTRAC LTD
ATTN: M. MICELI
400 CORPORATE CT
SUITE E
SO. PLAINFIELD, NJ 07080

Project # 030601
WOODBRIDGE, HESS REFINERY/CLIF
HESS REFINERY
750 CLIFF ROAD
WOODBRIDGE, NJ

PO #

Date	Plant	Ticket Number	Shipping Destination	Zone Code	Tons	Unit Price	Product Amount	Sales Tax	Haulage Rate	Haulage Amount	Ticket Total
		QUARRY PROCESS- QP		0019							
07/14/14	BBQ	01645014	Woodbridge	990	26.77	7.0000	187.39	23.42	5.50	147.24	358.05
07/14/14	BBQ	01645019	Woodbridge	990	26.35	7.0000	184.45	23.06	5.50	144.93	352.44
07/14/14	BBQ	01645034	Woodbridge	990	25.41	7.0000	177.87	22.23	5.50	139.76	339.86
07/14/14	BBQ	01645057	Woodbridge	990	27.40	7.0000	191.80	23.98	5.50	150.70	366.48
07/14/14	BBQ	01645060	Woodbridge	990	26.29	7.0000	184.03	23.00	5.50	144.60	351.63
07/14/14	BBQ	01645062	Woodbridge	990	25.93	7.0000	181.51	22.69	5.50	142.62	346.82
07/14/14	BBQ	01645066	Woodbridge	990	26.85	7.0000	187.95	23.49	5.50	147.68	359.12
07/14/14	BBQ	01645081	Woodbridge	990	26.02	7.0000	182.14	22.77	5.50	143.11	348.02
07/14/14	BBQ	01645113	Woodbridge	990	25.88	7.0000	181.16	22.65	5.50	142.34	346.15
07/14/14	BBQ	01645153	Woodbridge	990	25.53	7.0000	178.71	22.34	5.50	140.42	341.47
07/14/14	BBQ	01645162	Woodbridge	990	27.70	7.0000	193.90	24.24	5.50	152.35	370.49
07/14/14	BBQ	01645196	Woodbridge	990	26.99	7.0000	188.93	23.62	5.50	148.45	361.00
07/14/14	BBQ	01645222	Woodbridge	990	24.61	7.0000	172.27	21.53	5.50	135.36	329.16
07/14/14	BBQ	01645226	Woodbridge	990	27.38	7.0000	191.66	23.96	5.50	150.59	366.21
07/14/14	BBQ	01645251	Woodbridge	990	25.39	7.0000	177.73	22.22	5.50	139.65	339.60
07/15/14	BBQ	01645319	Woodbridge	990	26.45	7.0000	185.15	23.14	5.50	145.48	353.77
07/15/14	BBQ	01645320	Woodbridge	990	26.69	7.0000	186.83	23.35	5.50	146.80	356.98
07/15/14	BBQ	01645324	Woodbridge	990	27.07	7.0000	189.49	23.69	5.50	148.89	362.07
07/15/14	BBQ	01645326	Woodbridge	990	26.83	7.0000	187.81	23.48	5.50	147.57	358.86
07/15/14	BBQ	01645328	Woodbridge	990	27.06	7.0000	189.42	23.68	5.50	148.83	361.93
07/15/14	BBQ	01645338	Woodbridge	990	26.94	7.0000	188.58	23.57	5.50	148.17	360.32
07/15/14	BBQ	01645344	Woodbridge	990	26.63	7.0000	186.41	23.30	5.50	146.47	356.18
07/15/14	BBQ	01645349	Woodbridge	990	26.68	7.0000	186.76	23.35	5.50	146.74	356.85
07/15/14	BBQ	01645352	Woodbridge	990	26.21	7.0000	183.47	22.93	5.50	144.16	350.56
07/15/14	BBQ	01645401	Woodbridge	990	21.02	7.0000	147.14	18.39	5.50	115.61	281.14

Total Due $8,775.16

- Continued on the Next Page -

Stavola Companies

P.O. Box 482
Red Bank, NJ 07701
Phone: (732) 542-2328 Fax: (732) 542-2615

INVOICE

Date 07/19/14
Invoice # 260569MB

Stavola Construction Materials
Customer 02705
ENVIROTRAC LTD
ATTN: M. MICELI
400 CORPORATE CT
SUITE E
SO. PLAINFIELD, NJ 07080

Project # 030601
WOODBRIDGE, HESS REFINERY/CLIF
HESS REFINERY
750 CLIFF ROAD
WOODBRIDGE, NJ

PO #

Date	Plant	Ticket Number	Shipping Destination	Zone Code	Tons	Unit Price	Product Amount	Sales Tax	Haulage Rate	Haulage Amount	Ticket Total
Subtotal	BBQ QUARRY PROCESS- QP			0019	656.08 (595.19 MG)	7.0000	4,592.56	574.08	5.50	3,608.52	8,775.16

B Received NB
EnviroTrac Ltd.
JUL 28 2014
P 08.~~BOO~~ HJP001.05
T 16 Acct 5100
ST — App DJL

TERMS Net 30

Material	$4,592.56
Haulage	$3,608.52
Tax	$574.08
Receipt Amt	$0.00
Total Due	$8,775.16

Stavola Companies
P.O. Box 482
Red Bank, NJ 07701
Phone: (732) 542-2328 Fax: (732) 542-2615

INVOICE

Date 06/30/14
Invoice # 258782MB

Stavola Construction Materials
Customer 02705
ENVIROTRAC LTD
ATTN: M. MICELI
400 CORPORATE CT
SUITE E
SO. PLAINFIELD, NJ 07080

Project # 030601
WOODBRIDGE, HESS REFINERY/CLIF
HESS REFINERY
750 CLIFF ROAD
WOODBRIDGE, NJ

PO #

Date	Plant	Ticket Number	Shipping Destination	Zone Code	Tons	Unit Price	Product Amount	Sales Tax	Haulage Rate	Haulage Amount	Ticket Total
		QUARRY PROCESS- QP		0019							
06/27/14	BBQ	01639043	Sewaren	989	25.96	7.0000	181.72	22.72	5.50	142.78	347.22
06/27/14	BBQ	01639046	Sewaren	989	26.48	7.0000	185.36	23.17	5.50	145.64	354.17
06/27/14	BBQ	01639048	Sewaren	989	25.86	7.0000	181.02	22.63	5.50	142.23	345.88
06/27/14	BBQ	01639051	Sewaren	989	26.87	7.0000	188.09	23.51	5.50	147.79	359.39
06/27/14	BBQ	01639054	Sewaren	989	26.50	7.0000	185.50	23.19	5.50	145.75	354.44
06/27/14	BBQ	01639057	Sewaren	989	26.04	7.0000	182.28	22.79	5.50	143.22	348.29
06/27/14	BBQ	01639059	Sewaren	989	26.98	7.0000	188.86	23.61	5.50	148.39	360.86
06/27/14	BBQ	01639060	Sewaren	989	26.39	7.0000	184.73	23.09	5.50	145.15	352.97
06/27/14	BBQ	01639062	Sewaren	989	26.08	7.0000	182.56	22.82	5.50	143.44	348.82
06/27/14	BBQ	01639068	Sewaren	989	26.34	7.0000	184.38	23.05	5.50	144.87	352.30
06/27/14	BBQ	01639073	Sewaren	989	27.45	7.0000	192.15	24.02	5.50	150.98	367.15
06/27/14	BBQ	01639075	Sewaren	989	25.45	7.0000	178.15	22.27	5.50	139.98	340.40
06/27/14	BBQ	01639084	Sewaren	989	27.66	7.0000	193.62	24.20	5.50	152.13	369.95
06/27/14	BBQ	01639087	Sewaren	989	26.37	7.0000	184.59	23.07	5.50	145.04	352.70
06/27/14	BBQ	01639088	Sewaren	989	26.45	7.0000	185.15	23.14	5.50	145.48	353.77
06/27/14	BBQ	01639092	Sewaren	989	26.62	7.0000	186.34	23.29	5.50	146.41	356.04
06/27/14	BBQ	01639114	Sewaren	989	26.56	7.0000	185.92	23.24	5.50	146.08	355.24
06/27/14	BBQ	01639152	Sewaren	989	25.40	7.0000	177.80	22.23	5.50	139.70	339.73
06/27/14	BBQ	01639157	Sewaren	989	25.39	7.0000	177.73	22.22	5.50	139.65	339.60
06/27/14	BBQ	01639158	Sewaren	989	26.70	7.0000	186.90	23.36	5.50	146.85	357.11
06/27/14	BBQ	01639160	Sewaren	989	25.64	7.0000	179.48	22.44	5.50	141.02	342.94
06/27/14	BBQ	01639165	Sewaren	989	25.38	7.0000	177.66	22.21	5.50	139.59	339.46
06/27/14	BBQ	01639167	Sewaren	989	26.51	7.0000	185.57	23.20	5.50	145.81	354.58
06/27/14	BBQ	01639173	Sewaren	989	26.69	7.0000	186.83	23.35	5.50	146.80	356.98
06/27/14	BBQ	01639175	Sewaren	989	26.39	7.0000	184.73	23.09	5.50	145.15	352.97
06/27/14	BBQ	01639177	Sewaren	989	26.45	7.0000	185.15	23.14	5.50	145.48	353.77

Total Due $26,320.09

- Continued on the Next Page -

2c

Stavola Companies

P.O. Box 482
Red Bank, NJ 07701
Phone: (732) 542-2328 Fax: (732) 542-2615

INVOICE

Date 06/30/14
Invoice # 258782MB

Stavola Construction Materials
Customer 02705
ENVIROTRAC LTD
ATTN: M. MICELI
400 CORPORATE CT
SUITE E
SO. PLAINFIELD, NJ 07080

Project # 030601
WOODBRIDGE, HESS REFINERY/CLIF
HESS REFINERY
750 CLIFF ROAD
WOODBRIDGE, NJ

PO #

Date	Plant	Ticket Number	Shipping Destination	Zone Code	Tons	Unit Price	Product Amount	Sales Tax	Haulage Rate	Haulage Amount	Ticket Total
06/27/14	BBQ	01639187	Sewaren	989	25.98	7.0000	181.86	22.73	5.50	142.89	347.48
06/27/14	BBQ	01639191	Sewaren	989	26.26	7.0000	183.82	22.98	5.50	144.43	351.23
06/27/14	BBQ	01639193	Sewaren	989	26.10	7.0000	182.70	22.84	5.50	143.55	349.09
06/27/14	BBQ	01639194	Sewaren	989	26.92	7.0000	188.44	23.56	5.50	148.06	360.06
06/27/14	BBQ	01639203	Sewaren	989	26.03	7.0000	182.21	22.78	5.50	143.17	348.16
06/27/14	BBQ	01639233	Sewaren	989	26.60	7.0000	186.20	23.28	5.50	146.30	355.78
06/27/14	BBQ	01639241	Sewaren	989	26.60	7.0000	186.20	23.28	5.50	146.30	355.78
06/27/14	BBQ	01639246	Sewaren	989	27.90	7.0000	195.30	24.41	5.50	153.45	373.16
06/27/14	BBQ	01639247	Sewaren	989	26.61	7.0000	186.27	23.28	5.50	146.36	355.91
06/27/14	BBQ	01639301	Sewaren	989	26.19	7.0000	183.33	22.92	5.50	144.05	350.30
06/27/14	BBQ	01639399	Sewaren	989	24.16	7.0000	169.12	21.14	5.50	132.88	323.14
06/27/14	BBQ	01639429	Sewaren	989	22.12	7.0000	154.84	19.36	5.50	121.66	295.86
06/27/14	BBQ	01639461	Sewaren	989	21.25	7.0000	148.75	18.59	5.50	116.88	284.22
06/27/14	BBQ	01639464	Sewaren	989	21.99	7.0000	153.93	19.24	5.50	120.95	294.12
06/27/14	BBQ	01639471	Sewaren	989	25.21	7.0000	176.47	22.06	5.50	138.66	337.19
06/30/14	BBQ	01640118	Woodbridge	990	26.21	7.0000	183.47	22.93	5.50	144.16	350.56
06/30/14	BBQ	01640123	Woodbridge	990	23.95	7.0000	167.65	20.96	5.50	131.73	320.34
06/30/14	BBQ	01640133	Woodbridge	990	24.55	7.0000	171.85	21.48	5.50	135.03	328.36
06/30/14	BBQ	01640134	Woodbridge	990	23.62	7.0000	165.34	20.67	5.50	129.91	315.92
06/30/14	BBQ	01640135	Woodbridge	990	27.08	7.0000	189.56	23.70	5.50	148.94	362.20
06/30/14	BBQ	01640136	Woodbridge	990	26.15	7.0000	183.05	22.88	5.50	143.83	349.76
06/30/14	BBQ	01640143	Woodbridge	990	26.15	7.0000	183.05	22.88	5.50	143.83	349.76
06/30/14	BBQ	01640145	Woodbridge	990	26.12	7.0000	182.84	22.86	5.50	143.66	349.36
06/30/14	BBQ	01640149	Woodbridge	990	25.73	7.0000	180.11	22.51	5.50	141.52	344.14
06/30/14	BBQ	01640164	Woodbridge	990	27.04	7.0000	189.28	23.66	5.50	148.72	361.66
06/30/14	BBQ	01640167	Woodbridge	990	26.32	7.0000	184.24	23.03	5.50	144.76	352.03
06/30/14	BBQ	01640168	Woodbridge	990	26.65	7.0000	186.55	23.32	5.50	146.58	356.45
06/30/14	BBQ	01640176	Woodbridge	990	25.74	7.0000	180.18	22.52	5.50	141.57	344.27

Total Due $26,320.09

- Continued on the Next Page -

Stavola Companies
P.O. Box 482
Red Bank, NJ 07701
Phone: (732) 542-2328 Fax: (732) 542-2615

INVOICE

Date 06/30/14
Invoice # 258782MB

Stavola Construction Materials
Customer 02705
ENVIROTRAC LTD
ATTN: M. MICELI
400 CORPORATE CT
SUITE E
SO. PLAINFIELD, NJ 07080

Project # 030601
WOODBRIDGE, HESS REFINERY/CLIF
HESS REFINERY
750 CLIFF ROAD
WOODBRIDGE, NJ

PO #

Date	Plant	Ticket Number	Shipping Destination	Zone Code	Tons	Unit Price	Product Amount	Sales Tax	Haulage Rate	Haulage Amount	Ticket Total
06/30/14	BBQ	01640179	Woodbridge	990	27.33	7.0000	191.31	23.91	5.50	150.32	365.54
06/30/14	BBQ	01640183	Woodbridge	990	25.58	7.0000	179.06	22.38	5.50	140.69	342.13
06/30/14	BBQ	01640192	Woodbridge	990	24.88	7.0000	174.16	21.77	5.50	136.84	332.77
06/30/14	BBQ	01640201	Woodbridge	990	26.91	7.0000	188.37	23.55	5.50	148.01	359.93
06/30/14	BBQ	01640204	Woodbridge	990	26.31	7.0000	184.17	23.02	5.50	144.71	351.90
06/30/14	BBQ	01640210	Woodbridge	990	26.18	7.0000	183.26	22.91	5.50	143.99	350.16
06/30/14	BBQ	01640211	Woodbridge	990	25.69	7.0000	179.83	22.48	5.50	141.30	343.61
06/30/14	BBQ	01640238	Woodbridge	990	25.24	7.0000	176.68	22.09	5.50	138.82	337.59
06/30/14	BBQ	01640239	Woodbridge	990	26.34	7.0000	184.38	23.05	5.50	144.87	352.30
06/30/14	BBQ	01640242	Woodbridge	990	25.03	7.0000	175.21	21.90	5.50	137.67	334.78
06/30/14	BBQ	01640244	Woodbridge	990	25.98	7.0000	181.86	22.73	5.50	142.89	347.48
06/30/14	BBQ	01640260	Woodbridge	990	25.20	7.0000	176.40	22.05	5.50	138.60	337.05
06/30/14	BBQ	01640263	Woodbridge	990	25.16	7.0000	176.12	22.02	5.50	138.38	336.52
06/30/14	BBQ	01640264	Woodbridge	990	26.24	7.0000	183.68	22.96	5.50	144.32	350.96
06/30/14	BBQ	01640267	Woodbridge	990	26.97	7.0000	188.79	23.60	5.50	148.34	360.73
06/30/14	BBQ	01640270	Woodbridge	990	26.16	7.0000	183.12	22.89	5.50	143.88	349.89
06/30/14	BBQ	01640275	Woodbridge	990	26.11	7.0000	182.77	22.85	5.50	143.61	349.23
06/30/14	BBQ	01640293	Woodbridge	990	25.53	7.0000	178.71	22.34	5.50	140.42	341.47
06/30/14	BBQ	01640296	Woodbridge	990	24.22	7.0000	169.54	21.19	5.50	133.21	323.94
06/30/14	BBQ	01640298	Woodbridge	990	24.81	7.0000	173.67	21.71	5.50	136.46	331.84
06/30/14	BBQ	01640300	Woodbridge	990	25.95	7.0000	181.65	22.71	5.50	142.73	347.09
06/30/14	BBQ	01640306	Woodbridge	990	26.18	7.0000	183.26	22.91	5.50	143.99	350.16
Subtotal BBQ QUARRY PROCESS- QP				0019	1,967.84 (1,785.19 MG)	7.0000	13,774.88	1,721.92	5.50	10,823.29	26,320.09

B Received NB
EnviroTrac Ltd.
JUL 07 2014
P 08. ASP001.05
T 16 Acct 5100
ST — App AJC

TERMS Net 30

Material	$13,774.88
Haulage	10,823.29
Tax	$1,721.92
Receipt Amt	$0.00
Total Due	$26,320.09

Stavola Companies
P.O. Box 482
Red Bank, NJ 07701
Phone: (732) 542-2328 Fax: (732) 542-2615

INVOICE

Date 06/30/14
Invoice # 258783MB

Stavola Construction Materials
Customer 02705
ENVIROTRAC LTD
ATTN: M. MICELI
400 CORPORATE CT
SUITE E
SO. PLAINFIELD, NJ 07080

Project # 030601CD
WOODBRIDGE-HESS REFINERY
CLIFF ROAD

PO #

Date	Plant	Ticket Number	Shipping Destination	Zone Code	Tons	Unit Price	Product Amount	Sales Tax	Haulage Rate	Haulage Amount	Ticket Total
		1 1/2" CLEAN STONE		0011							
06/24/14	BBQ	01637505	Sewaren	989	24.95	13.0000	324.35	32.31	5.50	137.23	493.89
06/24/14	BBQ	01637516	Sewaren	989	24.20	13.0000	314.60	31.34	5.50	133.10	479.04
06/24/14	BBQ	01637518	Sewaren	989	25.47	13.0000	331.11	32.98	5.50	140.09	504.18
06/24/14	BBQ	01637535	Sewaren	989	24.92	13.0000	323.96	32.27	5.50	137.06	493.29
06/24/14	BBQ	01637536	Sewaren	989	26.44	13.0000	343.72	34.24	5.50	145.42	523.38
06/24/14	BBQ	01637538	Sewaren	989	24.98	13.0000	324.74	32.35	5.50	137.39	494.48
06/24/14	BBQ	01637559	Sewaren	989	26.35	13.0000	342.55	34.12	5.50	144.93	521.60
06/24/14	BBQ	01637563	Sewaren	989	26.94	13.0000	350.22	34.89	5.50	148.17	533.28
06/24/14	BBQ	01637564	Sewaren	989	26.28	13.0000	341.64	34.03	5.50	144.54	520.21
06/24/14	BBQ	01637568	Sewaren	989	26.46	13.0000	343.98	34.27	5.50	145.53	523.78
06/24/14	BBQ	01637590	Sewaren	989	25.90	13.0000	336.70	33.54	5.50	142.45	512.69
06/24/14	BBQ	01637601	Sewaren	989	25.81	13.0000	335.53	33.42	5.50	141.96	510.91
06/24/14	BBQ	01637610	Sewaren	989	26.02	13.0000	338.26	33.70	5.50	143.11	515.07
06/24/14	BBQ	01637612	Sewaren	989	25.96	13.0000	337.48	33.62	5.50	142.78	513.88
06/24/14	BBQ	01637701	Sewaren	989	26.42	13.0000	343.46	34.21	5.50	145.31	522.98
06/24/14	BBQ	01637707	Sewaren	989	26.78	13.0000	348.14	34.68	5.50	147.29	530.11
06/24/14	BBQ	01637708	Sewaren	989	25.78	13.0000	335.14	33.39	5.50	141.79	510.32
06/24/14	BBQ	01637711	Sewaren	989	26.20	13.0000	340.60	33.93	5.50	144.10	518.63
06/24/14	BBQ	01637718	Sewaren	989	25.52	13.0000	331.76	33.05	5.50	140.36	505.17
06/24/14	BBQ	01637726	Sewaren	989	25.63	13.0000	333.19	33.19	5.50	140.97	507.35
06/24/14	BBQ	01637729	Sewaren	989	25.99	13.0000	337.87	33.66	5.50	142.95	514.48
06/24/14	BBQ	01637731	Sewaren	989	25.65	13.0000	333.45	33.22	5.50	141.08	507.75
06/24/14	BBQ	01637767	Sewaren	989	26.06	13.0000	338.78	33.75	5.50	143.33	515.86
06/24/14	BBQ	01637770	Sewaren	989	26.63	13.0000	346.19	34.49	5.50	146.47	527.15
06/24/14	BBQ	01637772	Sewaren	989	24.73	13.0000	321.49	32.03	5.50	136.02	489.54
06/24/14	BBQ	01637818	Sewaren	989	21.93	13.0000	285.09	28.40	5.50	120.62	434.11

Total Due $53,607.70

- Continued on the Next Page -

Stavola Companies

P.O. Box 482
Red Bank, NJ 07701
Phone: (732) 542-2328 Fax: (732) 542-2615

INVOICE

Date 06/30/14
Invoice # 258783MB

Stavola Construction Materials
Customer 02705
ENVIROTRAC LTD
ATTN: M. MICELI
400 CORPORATE CT
SUITE E
SO. PLAINFIELD, NJ 07080

Project # 030601CD
WOODBRIDGE-HESS REFINERY
CLIFF ROAD

PO #

Date	Plant	Ticket Number	Shipping Destination	Zone Code	Tons	Unit Price	Product Amount	Sales Tax	Haulage Rate	Haulage Amount	Ticket Total
06/24/14	BBQ	01637824	Sewaren	989	22.73	13.0000	295.49	29.44	5.50	125.02	449.95
06/24/14	BBQ	01637826	Sewaren	989	25.49	13.0000	331.37	33.01	5.50	140.20	504.58
06/24/14	BBQ	01637830	Sewaren	989	25.60	13.0000	332.80	33.15	5.50	140.80	506.75
06/24/14	BBQ	01637832	Sewaren	989	26.72	13.0000	347.36	34.60	5.50	146.96	528.92
06/24/14	BBQ	01637834	Sewaren	989	25.60	13.0000	332.80	33.15	5.50	140.80	506.75
06/24/14	BBQ	01637838	Sewaren	989	21.44	13.0000	278.72	27.76	5.50	117.92	424.40
06/24/14	BBQ	01637839	Sewaren	989	26.55	13.0000	345.15	34.38	5.50	146.03	525.56
06/24/14	BBQ	01637842	Sewaren	989	25.79	13.0000	335.27	33.40	5.50	141.85	510.52
06/24/14	BBQ	01637860	Sewaren	989	27.14	13.0000	352.82	35.15	5.50	149.27	537.24
06/25/14	BBQ	01637934	Sewaren	989	26.44	13.0000	343.72	34.24	5.50	145.42	523.38
06/25/14	BBQ	01637938	Sewaren	989	27.27	13.0000	354.51	35.32	5.50	149.99	539.82
06/25/14	BBQ	01637943	Sewaren	989	27.17	13.0000	353.21	35.19	5.50	149.44	537.84
06/25/14	BBQ	01637945	Sewaren	989	25.86	13.0000	336.18	33.49	5.50	142.23	511.90
06/25/14	BBQ	01637954	Sewaren	989	25.84	13.0000	335.92	33.46	5.50	142.12	511.50
06/25/14	BBQ	01638001	Sewaren	989	25.94	13.0000	337.22	33.59	5.50	142.67	513.48
06/25/14	BBQ	01638003	Sewaren	989	26.06	13.0000	338.78	33.75	5.50	143.33	515.86
06/25/14	BBQ	01638006	Sewaren	989	26.12	13.0000	339.56	33.83	5.50	143.66	517.05
06/25/14	BBQ	01638008	Sewaren	989	24.84	13.0000	322.92	32.17	5.50	136.62	491.71
06/25/14	BBQ	01638011	Sewaren	989	25.80	13.0000	335.40	33.41	5.50	141.90	510.71
06/25/14	BBQ	01638014	Sewaren	989	26.27	13.0000	341.51	34.02	5.50	144.49	520.02
06/25/14	BBQ	01638078	Sewaren	989	25.35	13.0000	329.55	32.83	5.50	139.43	501.81
06/25/14	BBQ	01638217	Sewaren	989	26.20	13.0000	340.60	33.93	5.50	144.10	518.63
06/25/14	BBQ	01638219	Sewaren	989	26.30	13.0000	341.90	34.06	5.50	144.65	520.61
06/25/14	BBQ	01638223	Sewaren	989	25.58	13.0000	332.54	33.13	5.50	140.69	506.36
06/25/14	BBQ	01638229	Sewaren	989	26.51	13.0000	344.63	34.33	5.50	145.81	524.77
06/25/14	BBQ	01638236	Sewaren	989	25.55	13.0000	332.15	33.09	5.50	140.53	505.77
06/25/14	BBQ	01638243	Sewaren	989	28.15	13.0000	365.95	36.45	5.50	154.83	557.23
06/25/14	BBQ	01638246	Sewaren	989	27.47	13.0000	357.11	35.57	5.50	151.09	543.77

Total Due $53,607.70

- Continued on the Next Page -

Stavola Companies

P.O. Box 482
Red Bank, NJ 07701
Phone: (732) 542-2328 Fax: (732) 542-2615

INVOICE

Date 06/30/14
Invoice # 258783MB

Stavola Construction Materials
Customer 02705
ENVIROTRAC LTD
ATTN: M. MICELI
400 CORPORATE CT
SUITE E
SO. PLAINFIELD, NJ 07080

Project # 030601CD
WOODBRIDGE-HESS REFINERY
CLIFF ROAD

PO #

Date	Plant	Ticket Number	Shipping Destination	Zone Code	Tons	Unit Price	Product Amount	Sales Tax	Haulage Rate	Haulage Amount	Ticket Total
06/25/14	BBQ	01638262	Sewaren	989	26.60	13.0000	345.80	34.45	5.50	146.30	526.55
06/25/14	BBQ	01638273	Sewaren	989	26.60	13.0000	345.80	34.45	5.50	146.30	526.55
06/25/14	BBQ	01638274	Sewaren	989	26.01	13.0000	338.13	33.68	5.50	143.06	514.87
06/25/14	BBQ	01638285	Sewaren	989	26.95	13.0000	350.35	34.90	5.50	148.23	533.48
06/25/14	BBQ	01638351	Sewaren	989	27.81	13.0000	361.53	36.01	5.50	152.96	550.50
06/25/14	BBQ	01638369	Sewaren	989	25.33	13.0000	329.29	32.80	5.50	139.32	501.41
06/25/14	BBQ	01638388	Sewaren	989	26.10	13.0000	339.30	33.80	5.50	143.55	516.65
06/26/14	BBQ	01638617	Sewaren	989	26.45	13.0000	343.85	34.25	5.50	145.48	523.58
06/26/14	BBQ	01638618	Sewaren	989	25.44	13.0000	330.72	32.94	5.50	139.92	503.58
06/26/14	BBQ	01638693	Sewaren	989	26.00	13.0000	338.00	33.67	5.50	143.00	514.67
06/26/14	BBQ	01638702	Sewaren	989	27.17	13.0000	353.21	35.19	5.50	149.44	537.84
06/26/14	BBQ	01638704	Sewaren	989	25.72	13.0000	334.36	33.31	5.50	141.46	509.13
06/26/14	BBQ	01638711	Sewaren	989	25.53	13.0000	331.89	33.06	5.50	140.42	505.37
06/26/14	BBQ	01638725	Sewaren	989	26.45	13.0000	343.85	34.25	5.50	145.48	523.58
06/26/14	BBQ	01638726	Sewaren	989	26.81	13.0000	348.53	34.72	5.50	147.46	530.71
06/26/14	BBQ	01638729	Sewaren	989	26.19	13.0000	340.47	33.92	5.50	144.05	518.44
06/26/14	BBQ	01638732	Sewaren	989	25.77	13.0000	335.01	33.37	5.50	141.74	510.12
06/26/14	BBQ	01638733	Sewaren	989	25.89	13.0000	336.57	33.53	5.50	142.40	512.50
06/26/14	BBQ	01638739	Sewaren	989	26.02	13.0000	338.26	33.70	5.50	143.11	515.07
06/26/14	BBQ	01638744	Sewaren	989	27.42	13.0000	356.46	35.51	5.50	150.81	542.78
06/26/14	BBQ	01638747	Sewaren	989	26.89	13.0000	349.57	34.82	5.50	147.90	532.29
06/26/14	BBQ	01638749	Sewaren	989	26.04	13.0000	338.52	33.72	5.50	143.22	515.46
06/26/14	BBQ	01638757	Sewaren	989	26.12	13.0000	339.56	33.83	5.50	143.66	517.05
06/26/14	BBQ	01638770	Sewaren	989	24.55	13.0000	319.15	31.79	5.50	135.03	485.97
06/26/14	BBQ	01638772	Sewaren	989	26.69	13.0000	346.97	34.56	5.50	146.80	528.33
06/26/14	BBQ	01638774	Sewaren	989	24.75	13.0000	321.75	32.05	5.50	136.13	489.93
06/26/14	BBQ	01638775	Sewaren	989	25.64	13.0000	333.32	33.20	5.50	141.02	507.54
06/26/14	BBQ	01638776	Sewaren	989	24.76	13.0000	321.88	32.06	5.50	136.18	490.12

Total Due $53,607.70

- Continued on the Next Page -

Stavola Companies

P.O. Box 482
Red Bank, NJ 07701
Phone: (732) 542-2328 Fax: (732) 542-2615

INVOICE

Date 06/30/14
Invoice # 258783MB

Stavola Construction Materials
Customer 02705
ENVIROTRAC LTD
ATTN: M. MICELI
400 CORPORATE CT
SUITE E
SO. PLAINFIELD, NJ 07080

Project # 030601CD
WOODBRIDGE-HESS REFINERY
CLIFF ROAD

PO #

Date	Plant	Ticket Number	Shipping Destination	Zone Code	Tons	Unit Price	Product Amount	Sales Tax	Haulage Rate	Haulage Amount	Ticket Total
06/26/14	BBQ	01638778	Sewaren	989	25.58	13.0000	332.54	33.13	5.50	140.69	506.36
06/26/14	BBQ	01638783	Sewaren	989	25.28	13.0000	328.64	32.74	5.50	139.04	500.42
06/26/14	BBQ	01638785	Sewaren	989	22.80	13.0000	296.40	29.53	5.50	125.40	451.33
06/26/14	BBQ	01638787	Sewaren	989	21.79	13.0000	283.27	28.22	5.50	119.85	431.34
06/26/14	BBQ	01638788	Sewaren	989	26.32	13.0000	342.16	34.08	5.50	144.76	521.00
06/26/14	BBQ	01638789	Sewaren	989	26.11	13.0000	339.43	33.81	5.50	143.61	516.85
06/26/14	BBQ	01638791	Sewaren	989	24.47	13.0000	318.11	31.69	5.50	134.59	484.39
06/26/14	BBQ	01638792	Sewaren	989	26.21	13.0000	340.73	33.94	5.50	144.16	518.83
06/26/14	BBQ	01638796	Sewaren	989	25.31	13.0000	329.03	32.78	5.50	139.21	501.02
06/26/14	BBQ	01638799	Sewaren	989	26.46	13.0000	343.98	34.27	5.50	145.53	523.78
06/26/14	BBQ	01638804	Sewaren	989	25.29	13.0000	328.77	32.75	5.50	139.10	500.62
06/26/14	BBQ	01638805	Sewaren	989	26.55	13.0000	345.15	34.38	5.50	146.03	525.56
06/26/14	BBQ	01638806	Sewaren	989	25.99	13.0000	337.87	33.66	5.50	142.95	514.48
06/26/14	BBQ	01638808	Sewaren	989	26.28	13.0000	341.64	34.03	5.50	144.54	520.21
06/26/14	BBQ	01638810	Sewaren	989	26.57	13.0000	345.41	34.41	5.50	146.14	525.96
06/26/14	BBQ	01638812	Sewaren	989	26.01	13.0000	338.13	33.68	5.50	143.06	514.87
06/26/14	BBQ	01638814	Sewaren	989	26.22	13.0000	340.86	33.95	5.50	144.21	519.02
06/26/14	BBQ	01638818	Sewaren	989	25.82	13.0000	335.66	33.44	5.50	142.01	511.11
06/26/14	BBQ	01638820	Sewaren	989	26.14	13.0000	339.82	33.85	5.50	143.77	517.44
06/26/14	BBQ	01638822	Sewaren	989	24.72	13.0000	321.36	32.01	5.50	135.96	489.33
06/26/14	BBQ	01638823	Sewaren	989	20.62	13.0000	268.06	26.70	5.50	113.41	408.17
06/26/14	BBQ	01638827	Sewaren	989	25.70	13.0000	334.10	33.28	5.50	141.35	508.73
06/26/14	BBQ	01638830	Sewaren	989	26.41	13.0000	343.33	34.20	5.50	145.26	522.79
Subtotal	BBQ	1 1/2" CLEAN STONE		0011	2,708.13 (2,456.77 MG)	13.0000	35,205.69	3,507.05	5.50	14,894.96	53,607.70

B Received NB
EnviroTrac Ltd.
JUL 07 2014
P 08.HSP001.05
T 16 Acct 5100
ST App AJC

TERMS Net 30

Material	$35,205.69
Haulage	14,894.96
Tax	$3,507.05
Receipt Amt	$0.00
Total Due	$53,607.70

Stavola Companies
P.O. Box 482
Red Bank, NJ 07701
Phone: (732) 542-2328 Fax: (732) 542-2615

INVOICE

Date 07/05/14
Invoice # 259334MB

Stavola Construction Materials
Customer 02705
ENVIROTRAC LTD
ATTN: M. MICELI
400 CORPORATE CT
SUITE E
SO. PLAINFIELD, NJ 07080

Project # 030601
WOODBRIDGE, HESS REFINERY/CLIF
HESS REFINERY
750 CLIFF ROAD
WOODBRIDGE, NJ

PO #

Date	Plant	Ticket Number	Shipping Destination	Zone Code	Tons	Unit Price	Product Amount	Sales Tax	Haulage Rate	Haulage Amount	Ticket Total
		QUARRY PROCESS- QP		0019							
07/01/14	BBQ	01640483	Woodbridge	990	25.62	7.0000	179.34	22.42	5.50	140.91	342.67
07/01/14	BBQ	01640484	Woodbridge	990	25.25	7.0000	176.75	22.09	5.50	138.88	337.72
07/01/14	BBQ	01640493	Woodbridge	990	26.59	7.0000	186.13	23.27	5.50	146.25	355.65
07/01/14	BBQ	01640500	Woodbridge	990	26.57	7.0000	185.99	23.25	5.50	146.14	355.38
07/01/14	BBQ	01640502	Woodbridge	990	24.03	7.0000	168.21	21.03	5.50	132.17	321.41
07/01/14	BBQ	01640506	Woodbridge	990	27.30	7.0000	191.10	23.89	5.50	150.15	365.14
07/01/14	BBQ	01640509	Woodbridge	990	26.49	7.0000	185.43	23.18	5.50	145.70	354.31
07/01/14	BBQ	01640512	Woodbridge	990	26.04	7.0000	182.28	22.79	5.50	143.22	348.29
07/01/14	BBQ	01640513	Woodbridge	990	26.92	7.0000	188.44	23.56	5.50	148.06	360.06
07/01/14	BBQ	01640516	Woodbridge	990	26.04	7.0000	182.28	22.79	5.50	143.22	348.29
07/01/14	BBQ	01640518	Woodbridge	990	26.41	7.0000	184.87	23.11	5.50	145.26	353.24
07/01/14	BBQ	01640519	Woodbridge	990	25.60	7.0000	179.20	22.40	5.50	140.80	342.40
07/01/14	BBQ	01640532	Woodbridge	990	27.30	7.0000	191.10	23.89	5.50	150.15	365.14
07/01/14	BBQ	01640537	Woodbridge	990	27.67	7.0000	193.69	24.21	5.50	152.19	370.09
07/01/14	BBQ	01640539	Woodbridge	990	27.55	7.0000	192.85	24.11	5.50	151.53	368.49
07/01/14	BBQ	01640540	Woodbridge	990	26.44	7.0000	185.08	23.14	5.50	145.42	353.64
07/01/14	BBQ	01640592	Woodbridge	990	25.82	7.0000	180.74	22.59	5.50	142.01	345.34
07/01/14	BBQ	01640594	Woodbridge	990	24.80	7.0000	173.60	21.70	5.50	136.40	331.70
07/01/14	BBQ	01640598	Woodbridge	990	26.31	7.0000	184.17	23.02	5.50	144.71	351.90
07/01/14	BBQ	01640599	Woodbridge	990	27.03	7.0000	189.21	23.65	5.50	148.67	361.53
07/01/14	BBQ	01640606	Woodbridge	990	27.83	7.0000	194.81	24.35	5.50	153.07	372.23
07/01/14	BBQ	01640608	Woodbridge	990	26.49	7.0000	185.43	23.18	5.50	145.70	354.31
07/01/14	BBQ	01640609	Woodbridge	990	22.63	7.0000	158.41	19.80	5.50	124.47	302.68
07/01/14	BBQ	01640614	Woodbridge	990	26.40	7.0000	184.80	23.10	5.50	145.20	353.10
07/01/14	BBQ	01640618	Woodbridge	990	26.11	7.0000	182.77	22.85	5.50	143.61	349.23
07/01/14	BBQ	01640621	Woodbridge	990	26.89	7.0000	188.23	23.53	5.50	147.90	359.66

Total Due $31,859.29

- Continued on the Next Page -

Stavola Companies
P.O. Box 482
Red Bank, NJ 07701
Phone: (732) 542-2328 Fax: (732) 542-2615

INVOICE

Date 07/05/14
Invoice # 259334MB

Stavola Construction Materials
Customer 02705
ENVIROTRAC LTD
ATTN: M. MICELI
400 CORPORATE CT
SUITE E
SO. PLAINFIELD, NJ 07080

Project # 030601
WOODBRIDGE, HESS REFINERY/CLIF
HESS REFINERY
750 CLIFF ROAD
WOODBRIDGE, NJ

PO #

Date	Plant	Ticket Number	Shipping Destination	Zone Code	Tons	Unit Price	Product Amount	Sales Tax	Haulage Rate	Haulage Amount	Ticket Total
07/01/14	BBQ	01640622	Woodbridge	990	27.54	7.0000	192.78	24.10	5.50	151.47	368.35
07/01/14	BBQ	01640629	Woodbridge	990	26.76	7.0000	187.32	23.42	5.50	147.18	357.92
07/01/14	BBQ	01640631	Woodbridge	990	27.13	7.0000	189.91	23.74	5.50	149.22	362.87
07/01/14	BBQ	01640635	Woodbridge	990	26.38	7.0000	184.66	23.08	5.50	145.09	352.83
07/01/14	BBQ	01640643	Woodbridge	990	26.45	7.0000	185.15	23.14	5.50	145.48	353.77
07/01/14	BBQ	01640644	Woodbridge	990	24.64	7.0000	172.48	21.56	5.50	135.52	329.56
07/01/14	BBQ	01640648	Woodbridge	990	26.01	7.0000	182.07	22.76	5.50	143.06	347.89
07/01/14	BBQ	01640651	Woodbridge	990	25.54	7.0000	178.78	22.35	5.50	140.47	341.60
07/01/14	BBQ	01640844	Woodbridge	990	27.24	7.0000	190.68	23.84	5.50	149.82	364.34
07/01/14	BBQ	01640854	Woodbridge	990	24.46	7.0000	171.22	21.40	5.50	134.53	327.15
07/01/14	BBQ	01640856	Woodbridge	990	26.28	7.0000	183.96	23.00	5.50	144.54	351.50
07/01/14	BBQ	01640858	Woodbridge	990	24.81	7.0000	173.67	21.71	5.50	136.46	331.84
07/01/14	BBQ	01640883	Woodbridge	990	25.64	7.0000	179.48	22.44	5.50	141.02	342.94
07/01/14	BBQ	01640957	Woodbridge	990	21.77	7.0000	152.39	19.05	5.50	119.74	291.18
07/02/14	BBQ	01640994	Woodbridge	990	24.78	7.0000	173.46	21.68	5.50	136.29	331.43
07/02/14	BBQ	01640997	Woodbridge	990	24.29	7.0000	170.03	21.25	5.50	133.60	324.88
07/02/14	BBQ	01641003	Woodbridge	990	26.90	7.0000	188.30	23.54	5.50	147.95	359.79
07/02/14	BBQ	01641006	Woodbridge	990	26.80	7.0000	187.60	23.45	5.50	147.40	358.45
07/02/14	BBQ	01641007	Woodbridge	990	26.53	7.0000	185.71	23.21	5.50	145.92	354.84
07/02/14	BBQ	01641010	Woodbridge	990	28.02	7.0000	196.14	24.52	5.50	154.11	374.77
07/02/14	BBQ	01641011	Woodbridge	990	27.30	7.0000	191.10	23.89	5.50	150.15	365.14
07/02/14	BBQ	01641012	Woodbridge	990	26.92	7.0000	188.44	23.56	5.50	148.06	360.06
07/02/14	BBQ	01641022	Woodbridge	990	26.02	7.0000	182.14	22.77	5.50	143.11	348.02
07/02/14	BBQ	01641036	Woodbridge	990	26.97	7.0000	188.79	23.60	5.50	148.34	360.73
07/02/14	BBQ	01641043	Woodbridge	990	26.63	7.0000	186.41	23.30	5.50	146.47	356.18
07/02/14	BBQ	01641052	Woodbridge	990	28.22	7.0000	197.54	24.69	5.50	155.21	377.44
07/02/14	BBQ	01641056	Woodbridge	990	26.90	7.0000	188.30	23.54	5.50	147.95	359.79
07/02/14	BBQ	01641058	Woodbridge	990	25.90	7.0000	181.30	22.66	5.50	142.45	346.41

Total Due $31,859.29

- Continued on the Next Page -

Stavola Companies

P.O. Box 482
Red Bank, NJ 07701
Phone: (732) 542-2328 Fax: (732) 542-2615

INVOICE

Date 07/05/14
Invoice # 259334MB

Stavola Construction Materials
Customer 02705
ENVIROTRAC LTD
ATTN: M. MICELI
400 CORPORATE CT
SUITE E
SO. PLAINFIELD, NJ 07080

Project # 030601
WOODBRIDGE, HESS REFINERY/CLIF
HESS REFINERY
750 CLIFF ROAD
WOODBRIDGE, NJ

PO #

Date	Plant	Ticket Number	Shipping Destination	Zone Code	Tons	Unit Price	Product Amount	Sales Tax	Haulage Rate	Haulage Amount	Ticket Total
07/02/14	BBQ	01641060	Woodbridge	990	25.04	7.0000	175.28	21.91	5.50	137.72	334.91
07/02/14	BBQ	01641065	Woodbridge	990	26.39	7.0000	184.73	23.09	5.50	145.15	352.97
07/02/14	BBQ	01641108	Woodbridge	990	25.68	7.0000	179.76	22.47	5.50	141.24	343.47
07/02/14	BBQ	01641110	Woodbridge	990	25.71	7.0000	179.97	22.50	5.50	141.41	343.88
07/02/14	BBQ	01641114	Woodbridge	990	26.37	7.0000	184.59	23.07	5.50	145.04	352.70
07/02/14	BBQ	01641115	Woodbridge	990	25.53	7.0000	178.71	22.34	5.50	140.42	341.47
07/02/14	BBQ	01641116	Woodbridge	990	25.74	7.0000	180.18	22.52	5.50	141.57	344.27
07/02/14	BBQ	01641118	Woodbridge	990	27.69	7.0000	193.83	24.23	5.50	152.30	370.36
07/02/14	BBQ	01641119	Woodbridge	990	27.28	7.0000	190.96	23.87	5.50	150.04	364.87
07/02/14	BBQ	01641124	Woodbridge	990	27.08	7.0000	189.56	23.70	5.50	148.94	362.20
07/02/14	BBQ	01641125	Woodbridge	990	26.41	7.0000	184.87	23.11	5.50	145.26	353.24
07/02/14	BBQ	01641136	Woodbridge	990	26.01	7.0000	182.07	22.76	5.50	143.06	347.89
07/02/14	BBQ	01641137	Woodbridge	990	24.71	7.0000	172.97	21.62	5.50	135.91	330.50
07/02/14	BBQ	01641139	Woodbridge	990	26.10	7.0000	182.70	22.84	5.50	143.55	349.09
07/02/14	BBQ	01641147	Woodbridge	990	26.24	7.0000	183.68	22.96	5.50	144.32	350.96
07/02/14	BBQ	01641156	Woodbridge	990	28.19	7.0000	197.33	24.67	5.50	155.05	377.05
07/02/14	BBQ	01641158	Woodbridge	990	26.11	7.0000	182.77	22.85	5.50	143.61	349.23
07/02/14	BBQ	01641159	Woodbridge	990	26.20	7.0000	183.40	22.93	5.50	144.10	350.43
07/02/14	BBQ	01641161	Woodbridge	990	26.19	7.0000	183.33	22.92	5.50	144.05	350.30
07/02/14	BBQ	01641163	Woodbridge	990	26.09	7.0000	182.63	22.83	5.50	143.50	348.96
07/02/14	BBQ	01641168	Woodbridge	990	26.09	7.0000	182.63	22.83	5.50	143.50	348.96
07/02/14	BBQ	01641170	Woodbridge	990	26.66	7.0000	186.62	23.33	5.50	146.63	356.58
07/02/14	BBQ	01641174	Woodbridge	990	25.66	7.0000	179.62	22.45	5.50	141.13	343.20
07/02/14	BBQ	01641176	Woodbridge	990	26.58	7.0000	186.06	23.26	5.50	146.19	355.51
07/02/14	BBQ	01641177	Woodbridge	990	24.00	7.0000	168.00	21.00	5.50	132.00	321.00
07/02/14	BBQ	01641178	Woodbridge	990	24.57	7.0000	171.99	21.50	5.50	135.14	328.63
07/02/14	BBQ	01641186	Woodbridge	990	26.80	7.0000	187.60	23.45	5.50	147.40	358.45
07/02/14	BBQ	01641191	Woodbridge	990	25.07	7.0000	175.49	21.94	5.50	137.89	335.32

Total Due $31,859.29

- Continued on the Next Page -

Stavola Companies

P.O. Box 482
Red Bank, NJ 07701
Phone: (732) 542-2328 Fax: (732) 542-2615

INVOICE

Date 07/05/14
Invoice # 259334MB

Stavola Construction Materials
Customer 02705
ENVIROTRAC LTD
ATTN: M. MICELI
400 CORPORATE CT
SUITE E
SO. PLAINFIELD, NJ 07080

Project # 030601
WOODBRIDGE, HESS REFINERY/CLIF
HESS REFINERY
750 CLIFF ROAD
WOODBRIDGE, NJ

PO #

Date	Plant	Ticket Number	Shipping Destination	Zone Code	Tons	Unit Price	Product Amount	Sales Tax	Haulage Rate	Haulage Amount	Ticket Total
07/02/14	BBQ	01641193	Woodbridge	990	25.25	7.0000	176.75	22.09	5.50	138.88	337.72
07/02/14	BBQ	01641195	Woodbridge	990	24.94	7.0000	174.58	21.82	5.50	137.17	333.57
07/02/14	BBQ	01641197	Woodbridge	990	24.87	7.0000	174.09	21.76	5.50	136.79	332.64
07/02/14	BBQ	01641199	Woodbridge	990	26.80	7.0000	187.60	23.45	5.50	147.40	358.45
07/02/14	BBQ	01641200	Woodbridge	990	27.20	7.0000	190.40	23.80	5.50	149.60	363.80
07/02/14	BBQ	01641209	Woodbridge	990	27.24	7.0000	190.68	23.84	5.50	149.82	364.34
07/02/14	BBQ	01641210	Woodbridge	990	27.22	7.0000	190.54	23.82	5.50	149.71	364.07
07/02/14	BBQ	01641211	Woodbridge	990	26.84	7.0000	187.88	23.49	5.50	147.62	358.99
07/02/14	BBQ	01641223	Woodbridge	990	26.47	7.0000	185.29	23.16	5.50	145.59	354.04
Subtotal	BBQ QUARRY PROCESS- QP			0019	2,381.98 (2,160.90 MG)	7.0000	16,673.86	2,084.33	5.50	13,101.10	31,859.29

B
Received
EnviroTrac Ltd.
NB
JUL 15 2014
P 08.HSP001.05
T 16
Acct 5100
ST
App DJC

TERMS Net 30

Material	$16,673.86
Haulage	13,101.10
Tax	$2,084.33
Receipt Amt	$0.00
Total Due	$31,859.29

Appendix XVIII

Soil Remedial Action Permit

New Jersey Department of Environmental Protection
Site Remediation Program

REMEDIAL ACTION PERMIT APPLICATION – SOIL

☒ LSRP ☐ Subsurface Evaluator (UHOT only)

Date Stamp
(For Department use only)

SECTION A. SITE NAME AND LOCATION

Site Name: Hess Corporation - Former Port Reading Complex - Aeration Basins (AOC 5)

List All AKAs: Buckeye Port Reading Terminal

Street Address: 750 Cliff Road

Municipality: Port Reading (Township, Borough, or City)

County: Middlesex Zip Code: 07064

Program Interest (PI) Number(s): 006148

Case Tracking Number(s): none assigned

Municipal Block(s) and Lot(s) of the entire site: Block 760 Lot 6

Is this site a Federal case?... ☐ Yes ☒ No

If "Yes," indicate the Federal Case Type:

☒ **RCRA GPRA 2020** ☐ **CERCLA/NPL** ☐ **USDOD** ☐ **USDOE**

☐ Other (explain):

SECTION B. PERMIT APPLICATION, MODIFICATION, AND TERMINATION FEES

Select One:	Effective on or Before June 30, 2014	Effective July 1, 2014
☒ Remedial Action Permit Application	$600.00	$750.00
☐ Remedial Action Permit Modification	$400.00	$500.00
☐ Remedial Action Permit Termination	$600.00	$750.00

SECTION C. FEE BILLING CONTACT PERSON

Business Name: Hess Corporation Phone: (732) 750-6616

Contact: John Schenkewitz Title: Manager, Remediation

Mailing Address: One Hess Plaza

City/Town: Woodbridge State: NJ Zip Code: 07095

Email Address: jschenkewitz@Hess.com

SECTION D. PERSON RESPONSIBLE FOR CONDUCTING THE REMEDIATION – CO-PERMITTEE

Affiliation/Name of Organization: Hess Corporation

First Name of Contact: John Last Name of Contact: Schenkewitz

Title: Manager, Remediation

Phone Number: (732) 750-6616 Ext: Fax: (732) 750-7795

Mailing Address: One Hess Plaza

City/Town: Woodbridge State: NJ Zip Code: 07095

Email Address: jschenkewitz@Hess.com

☒ Primary Responsibility for Permit Compliance

SECTION E. CURRENT OWNER OF THE SITE – CO-PERMITTEE

Affiliation/Name of Organization: Hess Corporation

First Name of Contact: John Last Name of Contact: Schenkewitz

Title: Manager, Remediation

Phone Number: (732) 750-6616 Ext: ____ Fax: (732) 750-7795

Mailing Address: One Hess Plaza

City/Town: Woodbridge State: NJ Zip Code: 07095

Email Address: jschenkewitz@Hess.com

☐ Primary Responsibility for Permit Compliance

SECTION F. DEED NOTICE INFORMATION

1. Attach the following:
   ☒ Copy of the Filed Deed Notice or Deed Notice Termination document with Book & Page Numbers (both in paper and electronically in Adobe PDF format)
   ☒ Remedial Action Report (RAR) (electronically only - in Adobe PDF format)
2. Deed Notice filing date: ________________
3. Name of County Office the Deed Notice was filed in: Middlesex
4. Book Number the Deed Notice is filed in: ______________ Page Numbers: First: _________ to Last: _________
5. Total Number of Pages filed: _________
6. Block(s) and Lot(s): Block 760 Lot 6
7. Is the entire site restricted?........ ☐ Yes ☒ No
   If "No," what percent of the site is restricted? __________%
8. Is this Deed Notice for Historic Fill material at the site? .... ☐ Yes ☒ No
   If "Yes," is the Historic Fill material impacting the ground water at the site?........ ☐ Yes ☐ No
   If "Yes," has the CEA/WRA Fact Sheet Form been submitted to the NJDEP?........ ☐ Yes ☐ No
   If "No," please attach a completed CEA/WRA Fact Sheet Form to this application.
9. Has the Deed Notice restricted area been accurately mapped on NJ-GeoWeb?........ ☐ Yes ☒ No
   If "No", then submit a GIS compatible map of the Deed Notice restricted area by email to srpgis_dn@dep.state.nj.us and provide the date the email was sent: ______________________________

SECTION G. FINANCIAL ASSURANCE

1. Does the Remedial Action/Deed Notice include an engineering control?........ ☒ Yes ☐ No
   If "No," proceed to the next section.
2. Are any of the entities identified in Section D or E exempt from establishing Financial Assurance pursuant to N.J.A.C. 7:26C-7.10(c)?........ ☐ Yes ☒ No
   If "Yes," check the exemption(s) that applies:

Person Responsible for Conducting the Remediation – Co-Permittee	Current Owner of the Site – Co-Permittee	
☐	☐	Government entity
☐	☐	A person not liable pursuant to the Spill Act that purchased contaminated property before May 7, 2009
☐	☐	A person that conducted remediation at their primary or secondary residence
☐	☐	Owner or operator of a child care center
☐	☐	Public school or private school
☐	☐	Owner or operator of a small business responsible for conducting remediation at the location of the business

If all of the entities identified in Section D or E are exempt, proceed to the next section.

3. Is the current owner of the site either a homeowner association or a condominium association pursuant to the New Jersey Common Interest Association Act, N.J.S.A. 46:8A-1 et seq.? .... ☐ Yes ☒ No

   If "Yes," and the association is identified in Section E of this Permit Application, attach a copy of the association's annual budget that includes funds for the operation, maintenance, and monitoring of the engineering control(s) at the site.

4. Identify the estimated cost of the operation, maintenance, and monitoring of the engineering control(s) at the site: ....$ __________________

5. Are you using an existing Remediation Funding Source (RFS) mechanism for the site as the Financial Assurance? .... ☐ Yes ☒ No

   If "Yes," have all of the following criteria been met? .... ☐ Yes ☐ No

   a. There are no remaining areas of concern at the site that need additional remediation (i.e., the LSRP will be issuing a full site Remedial Action Outcome as a result of this permit issuance);
   b. The amount of funds in the RFS equals the amount of funds required to be posted for Financial Assurance; and
   c. The RFS is not in the form of a self-guarantee.

   Identify the full amount of the current RFS .... $ ______________________

6. Identify the full amount established as a Financial Assurance: .... $ ______________________
   Attach a completed Remediation Cost Review and RFS/FA Form.

7. What is the Financial Assurance Mechanism? *(check all that apply)*
   ☐ Remediation Trust Fund ☐ Line of Credit ☐ Loan or Grant
   ☐ Environmental Insurance Policy ☒ Letter of Credit

8. Contact information at the financial institution for the Financial Assurance:
   Financial Institution: Bank of Tokyo-Mitsubishi
   First Name of Contact: T. Last Name of Contact: Tilltson
   Mailing Address: 1251 Avenue of the Americas
   City/Town: New York State: NY Zip Code: 10020
   Email Address: ______________
   Phone Number: (212) 782-4000 Ext: ______________ Fax: ______________

9. Attach the original Financial Assurance mechanism or a copy of the RFS mechanism if using an existing RFS mechanism as the Financial Assurance.

SECTION H. ENGINEERING CONTROL

1. Current Land Use for the Engineering Controlled Area *(check all that apply)*
   ☒ Industrial ☐ Park or Recreational Use ☐ Child Care Center
   ☐ Residential ☐ Agricultural ☐ Hospital
   ☐ Commercial ☐ Road/Right of Way ☐ Vacant
   ☐ Government Facility ☐ School ☐ Other: ______________________

2. If school, childcare, or residential was checked above, was a presumptive remedy implemented pursuant to N.J.A.C. 7:26E-5.3? .... ☐ Yes ☐ No ☒ N/A

   If "No," when was the remedy approved by the NJDEP? __________________

3. Date Engineering Control(s) was installed: 2011-2012

4. Identify below the materials used for the engineering control(s).

Area	Engineering Control Description	Thickness	Units
100%- throughout AOC 5	Permeable Cover	12	Inches

*Other, describe:

5. In the following table, please list all contaminants that require the use of a Deed Notice/engineering control(s) (attach additional pages if needed).

Contaminant	Concentration (mg/kg)	Depth (feet)	Residential Direct Contact Soil Remediation Standard	Non-Residential Direct Contact Soil Remediation Standard
Chromium	161	8.5	NA	NA

SECTION I. RECEPTOR EVALUATION SUMMARY

1. Have any of the following been identified within 200 feet of the site boundary?
   Check all that apply.

   ☐ Residences ☐ Public parks and playgrounds
   ☐ Potable wells ☐ Surface water
   ☐ Public and private schools (K-12) ☐ Tier 1 Well-head protection areas
   ☐ Child care facilities ☒ Ecological receptor (e.g., wetlands, pinelands) Specify: wetlands

2. Have any of these receptors been impacted? ☐ Yes ☒ No
   If "Yes," date of Receptor Control: ________ Date of IEC Contaminant Source Control: ________

3. Have any vapor intrusion engineering controls/mitigation systems been installed as a result of this soil contamination? ☐ Yes ☒ No
   If "Yes," indicate the type of engineering control that was implemented: *(check all that apply)*

   ☐ Subsurface Depressurization System
   ☐ Subsurface Ventilation System
   ☐ Soil Vapor Extraction System
   ☐ HVAC Positive Pressure
   ☐ Other (specify): ________

   Attach the Operation, Maintenance, and Monitoring (OMM) Plan for the vapor intrusion engineering control(s)/mitigation system(s) both in paper and electronically (in "MS Word" file format). The OMM Plan should clearly identify the building(s) and/or structure(s) and vapor intrusion engineering control(s)/mitigation system(s) that are in place (e.g., active or passive), including the address and block and lot of each impacted property.

SECTION J. OTHER REMEDIAL ACTION PERMITS

Are other Remedial Action Permits also being applied for or already obtained? ☐ Yes ☒ No

If "Yes," please list the Permit Type, Permit Number, and Effective Date for each Remedial Action Permit obtained or the type of Remedial Action Permit(s) being applied for.

Remedial Action Permit for Groundwater

SECTION K. PERSON RESPONSIBLE FOR CONDUCTING THE REMEDIATION INFORMATION AND CERTIFICATION

Full Legal Name of the Person Responsible for Conducting the Remediation: Hess Corporation

Representative First Name: John Representative Last Name: Schenkewitz

Title: Remediation Manager

Phone Number: (732) 750-6616 Ext: ________ Fax: (732) 750-7795

Mailing Address: One Hess Plaza

City/Town: Woodbridge State: NJ Zip Code: 07095

Email Address: jschenkewitz@Hess.com

This certification shall be signed by the person responsible for conducting the remediation who is submitting this notification in accordance with Administrative Requirements for the Remediation of Contaminated Sites rule at N.J.A.C. 7:26C-1.5(a).

I certify under penalty of law that I have personally examined and am familiar with the information submitted herein, including all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, to the best of my knowledge, I believe that the submitted information is true, accurate and complete. I am aware that there are significant civil penalties for knowingly submitting false, inaccurate or incomplete information and that I am committing a crime of the fourth degree if I make a written false statement which I do not believe to be true. I am also aware that if I knowingly direct or authorize the violation of any statute, I am personally liable for the penalties.

Signature: ________ Date: ________

Name/Title: John Schenkewitz/ Remediation Manager

No Changes To Contact Information Since Last Submission ☐

SECTION L. CURRENT OWNER OF THE SITE INFORMATION AND CERTIFICATION

Full Legal Name of the Person who owns the site: Hess Corporation

Representative First Name: John   Representative Last Name: Schenkewitz

Title: Remediation Manager

Phone Number: (732) 750-6616   Ext: Fax: (732) 750-7795

Mailing Address: One Hess Plaza

City/Town: Woodbridge   State: NJ   Zip Code: 07095

Email Address: jschenkewitz@Hess.com

This certification shall be signed by the person who owns the site and is submitting this notification in accordance with Administrative Requirements for the Remediation of Contaminated Sites rule at N.J.A.C. 7:26C-1.5(a).

I certify under penalty of law that I have personally examined and am familiar with the information submitted herein, including all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, to the best of my knowledge, I believe that the submitted information is true, accurate and complete. I am aware that there are significant civil penalties for knowingly submitting false, inaccurate or incomplete information and that I am committing a crime of the fourth degree if I make a written false statement which I do not believe to be true. I am also aware that if I knowingly direct or authorize the violation of any statute, I am personally liable for the penalties.

Signature: ____________________   Date: ____________

Name/Title: John Schenkewitz/ Remediation Manager

No Changes To Contact Information Since Last Submission ☐

SECTION M. LICENSED SITE REMEDIATION PROFESSIONAL INFORMATION AND STATEMENT

LSRP ID Number: 594328

First Name: Dave Last Name: Schwartz

Phone Number: (609) 387-5553 Ext: ____ Fax: (609) 387-5533

Mailing Address: 6 Terri Lane, Suite 350

City/Town: Burlington State: NJ Zip Code: 08016

Email Address: DaveC@envirotrac.com

This statement shall be signed by the LSRP who is submitting this notification in accordance with SRRA Section 16 d. and Section 30 b.2.

I certify that I am a Licensed Site Remediation Professional authorized pursuant to N.J.S.A. 58:10C to conduct business in New Jersey. As the Licensed Site Remediation Professional of record for this remediation, I:

[SELECT ONE OR BOTH OF THE FOLLOWING AS APPLICABLE]:

☐ *directly oversaw and supervised all of the referenced remediation, and\or*

☒ *personally reviewed and accepted all of the referenced remediation presented herein.*

I believe that the information contained herein, and including all attached documents, is true, accurate and complete.

It is my independent professional judgment and opinion that the remediation conducted at this site, as reflected in this submission to the Department, conforms to, and is consistent with, the remediation requirements in N.J.S.A. 58:10C-14.

My conduct and decisions in this matter were made upon the exercise of reasonable care and diligence, and by applying the knowledge and skill ordinarily exercised by licensed site remediation professionals practicing in good standing, in accordance with N.J.S.A. 58:10C-16, in the State of New Jersey at the time I performed these professional services.

I am aware pursuant to N.J.S.A. 58:10C-17 that for purposely, knowingly or recklessly submitting false statement, representation or certification in any document or information submitted to the board or Department, etc., that there are significant civil, administrative and criminal penalties, including license revocation or suspension, fines and being punished by imprisonment for conviction of a crime of the third degree.

LSRP Signature: ____________________ Date: ____________

LSRP Name/Title: Melinda Schwartz / Senior Project Manager

Company Name: EnviroTrac Ltd.

No Changes To Contact Information Since Last Submission ☐

Completed forms should be sent to:

Bureau of Case Assignment & Initial Notice
Site Remediation Program
NJ Department of Environmental Protection
401-05H
PO Box 420
Trenton, NJ 08625-0420

SECTION M. SUBSURFACE EVALUATOR INFORMATION AND STATEMENT

I certify under penalty of law that the work was performed under my oversight and I have reviewed the report and all attached documents, and the submitted information is true, accurate and complete in accordance with the requirements of N.J.A.C. 7:14B and N.J.A.C. 7:26E. I am aware that there are significant civil and criminal penalties for submitting false, inaccurate or incomplete information including fines and/or imprisonment.

Name: ______________________ UST Cert. No.: ______________

Firm: ______________________ Firm's UST Cert. Number: ______________

Firm Address: ______________________

City/Town: ______________ State: ______________ Zip Code: ______________

Phone Number: ______________ Ext: ______________ Fax: ______________

Email Address ______________________

Signature: ______________________ Date: ______________

No Changes To Contact Information Since Last Submission ☐

Completed forms should be sent to:

Bureau of Case Assignment & Initial Notice
Site Remediation Program
NJ Department of Environmental Protection
401-05H
PO Box 420
Trenton, NJ 08625-0420

ADDENDUM A
Additional Persons Responsible For Conducting Remediation

ADDENDUM TO SECTION D. PERSON RESPONSIBLE FOR CONDUCTING THE REMEDIATION – CO-PERMITTEE

Affiliation/Name of Organization: ______________________

First Name of Contact: ______________ Last Name of Contact: ______________

Phone Number: ______________ Ext: ______________ Fax: ______________

Title: ______________________

City/Town: ______________ State: ______________ Zip Code: ______________

Email Address: ______________________

☐ Primary Responsibility for Permit Compliance

1. Does the Remedial Action/Deed Notice include an engineering control? ☐ Yes ☐ No
   If "No," proceed to the next section.
2. Are you exempt from establishing financial assurance pursuant to N.J.A.C. 7:26C-7.10(c)? ☐ Yes ☐ No
   If "Yes," check the exemption(s) that applies:
   - ☐ Government entity
   - ☐ A person not liable pursuant to the Spill Act that purchased contaminated property before May 7, 2009
   - ☐ A person that conducted remediation at their primary or secondary residence
   - ☐ Owner or operator of a child care center
   - ☐ Public school or private school
   - ☐ Owner or operator of a small business responsible for conducting remediation at the location of the business
3. Identify the estimated cost of the operation, maintenance, and monitoring of the engineering control(s) at the site: $ ______________
4. Are you using an existing Remediation Funding Source (RFS) mechanism for the site as the Financial Assurance? ☐ Yes ☐ No

   If "Yes," have <u>all</u> of the following criteria been met? ☐ Yes ☐ No

   a. There are no remaining areas of concern at the site that need additional remediation (i.e., the LSRP will be issuing a full site Remedial Action Outcome as a result of this permit issuance);
   b. The amount of funds in the RFS equals the amount of funds required to be posted for Financial Assurance; and
   c. The RFS is not in the form of a self-guarantee.

   Identify the full amount of the current RFS $ ______________
5. Identify the full amount established as a Financial Assurance: $ ______________
   Attach a completed Remediation Cost Review and RFS/FA Form.
6. What is the Financial Assurance Mechanism? *(check all that apply)*
   ☐ Remediation Trust Fund ☐ Line of Credit ☐ Loan or Grant
   ☐ Environmental Insurance Policy ☐ Letter of Credit
7. Contact information at the financial institution for the Financial Assurance:

   Financial Institution: ______________________

   First Name of Contact: ______________ Last Name of Contact: ______________

   Mailing Address: ______________________

   City/Town: ______________ State: ______________ Zip Code: ______________

   Email Address: ______________________

   Phone Number: ______________ Ext: ______________ Fax: ______________
8. Attach the original Financial Assurance mechanism or a copy of the RFS mechanism if using an existing RFS mechanism as the Financial Assurance.

ADDENDUM A

ADDENDUM TO SECTION K. PERSON RESPONSIBLE FOR CONDUCTING THE REMEDIATION INFORMATION AND CERTIFICATION

Full Legal Name of the Person Responsible for Conducting the Remediation: ______________________

Representative First Name: ______________________ Representative Last Name: ______________________

Title: ______________________

Phone Number: ______________________ Ext: ______________________ Fax: ______________________

Mailing Address: ______________________

City/Town: ______________________ State: ______________________ Zip Code: ______________________

Email Address: ______________________

This certification shall be signed by the person responsible for conducting the remediation who is submitting this notification in accordance with Administrative Requirements for the Remediation of Contaminated Sites rule at N.J.A.C. 7:26C-1.5(a).

I certify under penalty of law that I have personally examined and am familiar with the information submitted herein, including all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, to the best of my knowledge, I believe that the submitted information is true, accurate and complete. I am aware that there are significant civil penalties for knowingly submitting false, inaccurate or incomplete information and that I am committing a crime of the fourth degree if I make a written false statement which I do not believe to be true. I am also aware that if I knowingly direct or authorize the violation of any statute, I am personally liable for the penalties.

Signature: ______________________ Date: ______________________

Name/Title: ______________________

No Changes To Contact Information Since Last Submission ☐

ADDENDUM B
Additional Property Owners

ADDENDUM TO SECTION E. CURRENT OWNER OF THE SITE – CO-PERMITTEE

Affiliation/Name of Organization: ____________________

First Name of Contact: ____________________ Last Name of Contact: ____________________

Phone Number: ____________________ Ext: ____________________ Fax: ____________________

Title: ____________________

City/Town: ____________________ State: ____________________ Zip Code: ____________________

Email Address: ____________________

☐ Primary Responsibility for Permit Compliance

1. Does the Remedial Action/Deed Notice include an engineering control? ☐ Yes ☐ No

   If "No," proceed to next section.

2. Are you exempt from establishing financial assurance pursuant to N.J.A.C. 7:26C-7.10(c)? ☐ Yes ☐ No
   If "Yes," check the exemption that applies, and then proceed to the next section:

   ☐ Government entity
   ☐ A person not liable pursuant to the Spill Act that purchased contaminated property before May 7, 2009
   ☐ A person that conducted remediation at their primary or secondary residence
   ☐ Owner or operator of a child care center
   ☐ Public school or private school
   ☐ Owner or operator of a small business responsible for conducting remediation at the location of the business

3. Do you represent a homeowner association or a condominium association pursuant to the New Jersey Common Interest Association Act, N.J.S.A. 46:8A-1 et seq.? ☐ Yes ☐ No

   If "Yes," attach a copy of the association's annual budget that includes funds for the operation, maintenance, and monitoring of the engineering control(s) at the site.

4. Identify the estimated cost of the operation, maintenance, and monitoring of the engineering control(s) at the site: $ ____________________

5. Are you using an existing Remediation Funding Source (RFS) mechanism for the site as the Financial Assurance? ☐ Yes ☐ No

   If "Yes," have <u>all</u> of the following criteria been met? ☐ Yes ☐ No

   a. There are no remaining areas of concern at the site that need additional remediation (i.e., the LSRP will be issuing a full site Remedial Action Outcome as a result of this permit issuance);
   b. The amount of funds in the RFS equals the amount of funds required to be posted for Financial Assurance; and
   c. The RFS is not in the form of a self-guarantee.

   Identify the full amount of the current RFS $ ____________________

6. Identify the full amount established as a Financial Assurance: $ ____________________
   Attach a completed Remediation Cost Review and RFS/FA Form.

7. What is the Financial Assurance Mechanism? *(check all that apply)*

   ☐ Remediation Trust Fund ☐ Line of Credit ☐ Loan or Grant
   ☐ Environmental Insurance Policy ☐ Letter of Credit

ADDENDUM B

8. Contact information at the financial institution for the Financial Assurance:

   Financial Institution: ______________________________

   First Name of Contact: ______________ Last Name of Contact: ______________

   Mailing Address: ______________________________

   City/Town: ______________ State: ______________ Zip Code: ______________

   Email Address: ______________________________

   Phone Number: ______________ Ext: ______________ Fax: ______________

9. Attach the original Financial Assurance mechanism or a copy of the RFS mechanism if using an existing RFS mechanism as the Financial Assurance.

ADDENDUM TO SECTION L. CURRENT OWNER OF THE SITE INFORMATION AND CERTIFICATION

Full Legal Name of the Person who owns the site: ______________________________

Representative First Name: ______________ Representative Last Name: ______________

Title: ______________________________

Phone Number: ______________ Ext: ______________ Fax: ______________

Mailing Address: ______________________________

City/Town: ______________ State: ______________ Zip Code: ______________

Email Address: ______________________________

This certification shall be signed by the person who owns the site and is submitting this notification in accordance with Administrative Requirements for the Remediation of Contaminated Sites rule at N.J.A.C. 7:26C-1.5(a).

I certify under penalty of law that I have personally examined and am familiar with the information submitted herein, including all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, to the best of my knowledge, I believe that the submitted information is true, accurate and complete. I am aware that there are significant civil penalties for knowingly submitting false, inaccurate or incomplete information and that I am committing a crime of the fourth degree if I make a written false statement which I do not believe to be true. I am also aware that if I knowingly direct or authorize the violation of any statute, I am personally liable for the penalties.

Signature: ______________________________ Date: ______________

Name/Title: ______________________________

No Changes To Contact Information Since Last Submission ☐

IN ACCORDANCE WITH N.J.S.A. 58:10B-13, THIS DOCUMENT IS TO BE RECORDED IN THE SAME MANNER AS ARE DEEDS AND OTHER INTERESTS IN REAL PROPERTY.

Prepared by: ______________________________________
[Signature]

____
David J. Carlson on behalf of Hess Corporation- Port Reading

Recorded by: ______________________________________
[Signature, Officer of County Recording Office]

____
[Print name below signature]

DEED NOTICE

This Deed Notice is made as of the _____ day of _____, ____, by Hess Corporation of One Hess Plaza, Woodbridge, Middlesex County, New Jersey (together with his/her/its/their successors and assigns, collectively "Owner").

1. THE PROPERTY. Hess Corporation of One Hess Plaza, Woodbridge, Middlesex County, New Jersey is the owner in fee simple of certain real property designated as Block(s) 760 Lot 6, on the tax map of the Township of Woodbridge, Middlesex County; the New Jersey Department of Environmental Protection Program Interest Number (Preferred ID) for the contaminated site which includes this property is # 006148 and the property is more particularly described in Exhibit A, which is attached hereto and made a part hereof (the "Property").

2. REMEDIATION and DEPARTMENTAL OVERSIGHT.

i. DEPARTMENT'S ASSIGNED BUREAU. The Bureau of Case Management is the New Jersey Department of Environmental Protection program that was responsible for the oversight of the remediation of the Property. The area is commonly known as Area of Concern (AOC) 5- the Aeration Basins

ii. N.J.A.C. 7:26C-7 requires the Owner, among other persons, to obtain a soil remedial action permit for the soil remedial action at the Property. That permit will contain the monitoring, maintenance and biennial certification requirements that apply to the Property.

3. SOIL CONTAMINATION. Hess Corporation has remediated contaminated soil at the Property, such that soil contamination remains in certain areas of the Property that contains contaminants in concentrations that do not allow for the unrestricted use of the Property; this soil

contamination is described, including the type, concentration and specific location of such contaminants, in Exhibit B, which is attached hereto and made a part hereof. As a result, there is a statutory requirement for this Deed Notice and engineering controls in accordance with N.J.S.A. 58:10B-13.

4. CONSIDERATION. In accordance with the remedial action for the site which included the Property, and in consideration of the terms and conditions of that remedial action, and other good and valuable consideration, Owner has agreed to subject the Property to certain statutory and regulatory requirements that impose restrictions upon the use of the Property, to restrict certain uses of the Property, and to provide notice to subsequent owners, lessees and operators of the restrictions and the monitoring, maintenance, and biennial certification requirements outlined in this Deed Notice and required by law, as set forth herein.

5A. RESTRICTED AREAS. Due to the presence of contamination remaining at concentrations that do not allow for unrestricted use, the Owner has agreed, as part of the remedial action for the Property, to restrict the use of certain parts of the Property (the "Restricted Areas"); a narrative description of these restrictions is provided in Exhibit C, which is attached hereto and made a part hereof. The Owner has also agreed to maintain a list of these restrictions on site for inspection by governmental officials.

5B. RESTRICTED LAND USES. The following statutory land use restrictions apply to the Restricted Areas:

i. The Brownfield and Contaminated Site Remediation Act, N.J.S.A. 58:10B-12.g(10), prohibits the conversion of a contaminated site, remediated to non-residential soil remediation standards that require the maintenance of engineering or institutional controls, to a child care facility, or public, private, or charter school without the Department's prior written approval, unless a presumptive remedy is implemented; and

ii. The Brownfield and Contaminated Site Remediation Act, N.J.S.A. 58:10B-12.g(12), prohibits the conversion of a landfill, with gas venting systems and or leachate collection systems, to a single family residence or a child care facility without the Department's prior written approval.

5C. ENGINEERING CONTROLS. Due to the presence and concentration of these contaminants, the Owner has also agreed, as part of the remedial action for the Property, to the placement of certain engineering controls on the Property; a narrative description of these engineering controls is provided in Exhibit C.

6A. CHANGE IN OWNERSHIP AND REZONING.

i. The Owner and the subsequent owners and lessees, shall cause all leases, grants, and other written transfers of an interest in the Restricted Areas to contain a provision expressly requiring all holders thereof to take the Property subject to the restrictions contained herein and to comply with all, and not to violate any of the conditions of this Deed Notice. Nothing contained in this Paragraph shall be construed as limiting any obligation of any person to provide any notice required by any law, regulation, or order of any governmental authority.

ii. The Owner and the subsequent owners shall provide written notice to the Department of Environmental Protection on a form provided by the Department and available at www.nj.gov/srp/forms within thirty (30) calendar days after the effective date of any conveyance, grant, gift, or other transfer, in whole or in part, of the owner's interest in the Restricted Area.

iii. The Owner and the subsequent owners shall provide written notice to the Department, on a form available from the Department at www.nj.gov/srp/forms, within thirty (30) calendar days after the owner's petition for or filing of any document initiating a rezoning of the Property to residential.

6B. SUCCESSORS AND ASSIGNS. This Deed Notice shall be binding upon Owner and upon Owner's successors and assigns, and subsequent owners, lessees and operators while each is an owner, lessee, or operator of the Property.

7A. ALTERATIONS, IMPROVEMENTS, AND DISTURBANCES.

i. The Owner and all subsequent owners and lessees shall notify any person, including, without limitation, tenants, employees of tenants, and contractors, intending to conduct invasive work or excavate within the Restricted Areas, of the nature and location of contamination in the Restricted Areas, and, of the precautions necessary to minimize potential human exposure to contaminants.

ii. Except as provided in Paragraph 7B, below, no person shall make, or allow to be made, any alteration, improvement, or disturbance in, to, or about the Property which disturbs any engineering control at the Property without first obtaining a soil remedial action permit modification pursuant to N.J.A.C. 7:26C-7. Nothing herein shall constitute a waiver of the obligation of any person to comply with all applicable laws and regulations including, without limitation, the applicable rules of the Occupational Safety and Health Administration.

iii. Notwithstanding subparagraph 7Aii., above, a soil remedial action permit modification is not required for any alteration, improvement, or disturbance provided that the owner, lessee or operator:

(A) Notifies the Department of Environmental Protection of the activity by calling the DEP Hotline, at 1-877-WARN-DEP or 1-877-927-6337, within twenty-four (24) hours after the beginning of each alteration, improvement, or disturbance;

(B) Restores any disturbance of an engineering control to pre-disturbance conditions within sixty (60) calendar days after the initiation of the alteration, improvement or disturbance;

(C) Ensures that all applicable worker health and safety laws and regulations are followed during the alteration, improvement, or disturbance, and during the restoration;

(D) Ensures that human exposure to contamination in excess of the remediation standards does not occur; and

(E) Describes, in the next biennial certification the nature of the alteration, improvement, or disturbance, the dates and duration of the alteration, improvement, or disturbance, the name of key individuals and their affiliations conducting the alteration, improvement, or disturbance, a description of the notice the Owner gave to those persons prior to the disturbance.

7B. EMERGENCIES. In the event of an emergency which presents, or may present, an unacceptable risk to the public health and safety, or to the environment, or immediate environmental concern, see N.J.S.A. 58:10C-2, any person may temporarily breach an engineering control provided that that person complies with each of the following:

i. Immediately notifies the Department of Environmental Protection of the emergency, by calling the DEP Hotline at 1-877-WARNDEP or 1-877-927-6337;

ii. Hires a Licensed Site Remediation Professional (unless the Restricted Areas includes an unregulated heating oil tank) to respond to the emergency;

iii. Limits both the actual disturbance and the time needed for the disturbance to the minimum reasonably necessary to adequately respond to the emergency;

iv. Implements all measures necessary to limit actual or potential, present or future risk of exposure to humans or the environment to the contamination;

v. Notifies the Department of Environmental Protection when the emergency or immediate environmental concern has ended by calling the DEP Hotline at 1-877-WARNDEP or 1-877-927-6337; and

vi. Restores the engineering control to the pre-emergency conditions as soon as possible, and provides notification to the Department of Environmental Protection within sixty (60) calendar days after completion of the restoration of the engineering control, including: (a) the nature and likely cause of the emergency; (b) the potential discharges of or exposures to contaminants, if any, that may have occurred; (c) the measures that have been taken to mitigate the effects of the emergency on human health and the environment; (d) the measures completed or implemented to restore the engineering control; and (e) the changes to the engineering control or site operation and maintenance plan to prevent reoccurrence of such conditions in the future.

8. TERMINATION OF DEED NOTICE.

i. This Deed Notice may be terminated only upon filing of a Termination of Deed Notice, available at N.J.A.C. 7:26C Appendix C, with the office of the Registry Office of Middlesex County, New Jersey, expressly terminating this Deed Notice.

ii. Within thirty (30) calendar days after the filing of a Termination of Deed Notice, the owner of the property shall apply to the Department for termination of the soil remedial action permit pursuant to N.J.A.C. 7:26C-7.

9. ACCESS. The Owner, and the subsequent owners, lessees and operators agree to allow the Department, its agents and representatives access to the Property to inspect and evaluate the continued protectiveness of the remedial action that includes this Deed Notice and to conduct additional remediation to ensure the protection of the public health and safety and of the environment if the subsequent owners, lessees and operators, during their ownership, tenancy, or operation, and the Owner fail to conduct such remediation pursuant to this Deed Notice as required by law. The Owner, and the subsequent owners and lessees, shall also cause all leases, subleases, grants, and other written transfers of an interest in the Restricted Areas to contain a provision expressly requiring that all holders thereof provide such access to the Department.

10. ENFORCEMENT OF VIOLATIONS.

i. This Deed Notice itself is not intended to create any interest in real estate in favor of the Department of Environmental Protection, nor to create a lien against the Property, but merely is intended to provide notice of certain conditions and restrictions on the Property and to reflect the regulatory and statutory obligations imposed as a conditional remedial action for this site.

ii. The restrictions provided herein may be enforceable solely by the Department against any person who violates this Deed Notice. To enforce violations of this Deed Notice, the Department may initiate one or more enforcement actions pursuant to N.J.S.A. 58:10-23.11, and N.J.S.A. 58:10C, and require additional remediation and assess damages pursuant to N.J.S.A. 58:10-23.11, and N.J.S.A. 58:10C.

11. SEVERABILITY. If any court of competent jurisdiction determines that any provision of this Deed Notice requires modification, such provision shall be deemed to have been modified automatically to conform to such requirements. If a court of competent jurisdiction determines that any provision of this Deed Notice is invalid or unenforceable and the provision is of such a nature that it cannot be modified, the provision shall be deemed deleted from this instrument as though the provision had never been included herein. In either case, the remaining provisions of this Deed Notice shall remain in full force and effect.

12A. EXHIBIT A. Exhibit A includes the following maps of the Property and the vicinity:

i. Exhibit A-1: Vicinity Map - A map that identifies by name the roads, and other important geographical features in the vicinity of the Property (for example, USGS Quad map, Hagstrom County Maps);

ii. Exhibit A-2: Metes and Bounds Description - A tax map of lots and blocks as wells as metes and bounds description of the Property, including reference to tax lot and block numbers for the Property;

iii. Exhibit A-3: Property Map - A scaled map of the Property, scaled at one inch to 200 feet or less, and if more than one map is submitted, the maps shall be presented as overlays, keyed to a base map; and the Property Map shall include diagrams of major surface topographical features such as buildings, roads, and parking lots.

12B. EXHIBIT B. Exhibit B includes the following descriptions of the Restricted Areas:

i. Exhibit B-1: Restricted Area Map - A separate map for each restricted area that includes:

(A) As-built diagrams of each engineering control, including caps, fences, slurry walls, (and, if any) ground water monitoring wells, extent of the ground water classification exception area, pumping and treatment systems that may be required as part of a ground water engineering control in addition to the deed notice

(B) As-built diagrams of any buildings, roads, parking lots and other structures that function as engineering controls; and

(C) Designation of all soil and sediment sample locations within the restricted areas that exceed any soil or sediment standard that are keyed into one of the tables described in the following paragraph.

ii. Exhibit B-2: Restricted Area Data Table - A separate table for each restricted area that includes either (A) or (B) through (F):

(A) Only for historic fill extending over the entire site or a portion of the site and for which analytical data are limited or do not exist, a narrative that states that historic fill is present at the site, a description of the fill material (e.g., ash, cinders, brick, dredge material), and a statement that such material may include, but is not limited to, contaminants such as PAHs and metals;

(B) Sample location designation from Restricted Area map (Exhibit B-1);

(C) Sample elevation based upon mean sea level;

(D) Name and chemical abstract service registry number of each contaminant with a concentration that exceeds the unrestricted use standard;

(E) The restricted and unrestricted use standards for each contaminant in the table; and

(F) The remaining concentration of each contaminant at each sample location at each elevation.

12C. EXHIBIT C. Exhibit C includes narrative descriptions of the institutional controls and engineering controls as follows:

i. Exhibit C-1: Deed Notice as Institutional Control: Exhibit C-1 includes a narrative description of the restriction and obligations of this Deed Notice that are in addition to those described above, as follows:

(A) Description and estimated size of the Restricted Areas as described above;

(B) Description of the restrictions on the Property by operation of this Deed Notice; and

(C) The objective of the restrictions.

ii. Exhibit C-2: Impermeable Cap and Fence: Exhibit C-2 includes a narrative description of the Impermeable Cap and Fence as follows:

(A) Description of the engineering control;

(B) The objective of the engineering control; and

(C) How the engineering control is intended to function.

13. SIGNATURES. IN WITNESS WHEREOF, Owner has executed this Deed Notice as of the date first written above.

ATTEST: Hess Corporation

____________________________ By_________________________

____________________________ ____________________________

John Schenkewitz [Signature]

STATE OF NEW JERSEY SS.:
COUNTY OF MIDDLESEX

I certify that on ________, 20__, John Schenkewitz personally came before me, and this person acknowledged under oath, to my satisfaction, that:

(a) this person is the designated signee of Hess Corporation the corporation named in this document;

(b) this person is the attesting witness to the signing of this document by the proper corporate officer who is the vice president of the corporation;

(c) this document was signed and delivered by the corporation as its voluntary act and was duly authorized;

(d) this person knows the proper seal of the corporation which was affixed to this document; and

(e) this person signed this proof to attest to the truth of these facts.

____
[Signature]

____
[Print name and title of attesting witness]

Signed and sworn before me on ________, 20__

__________________________________, Notary Public

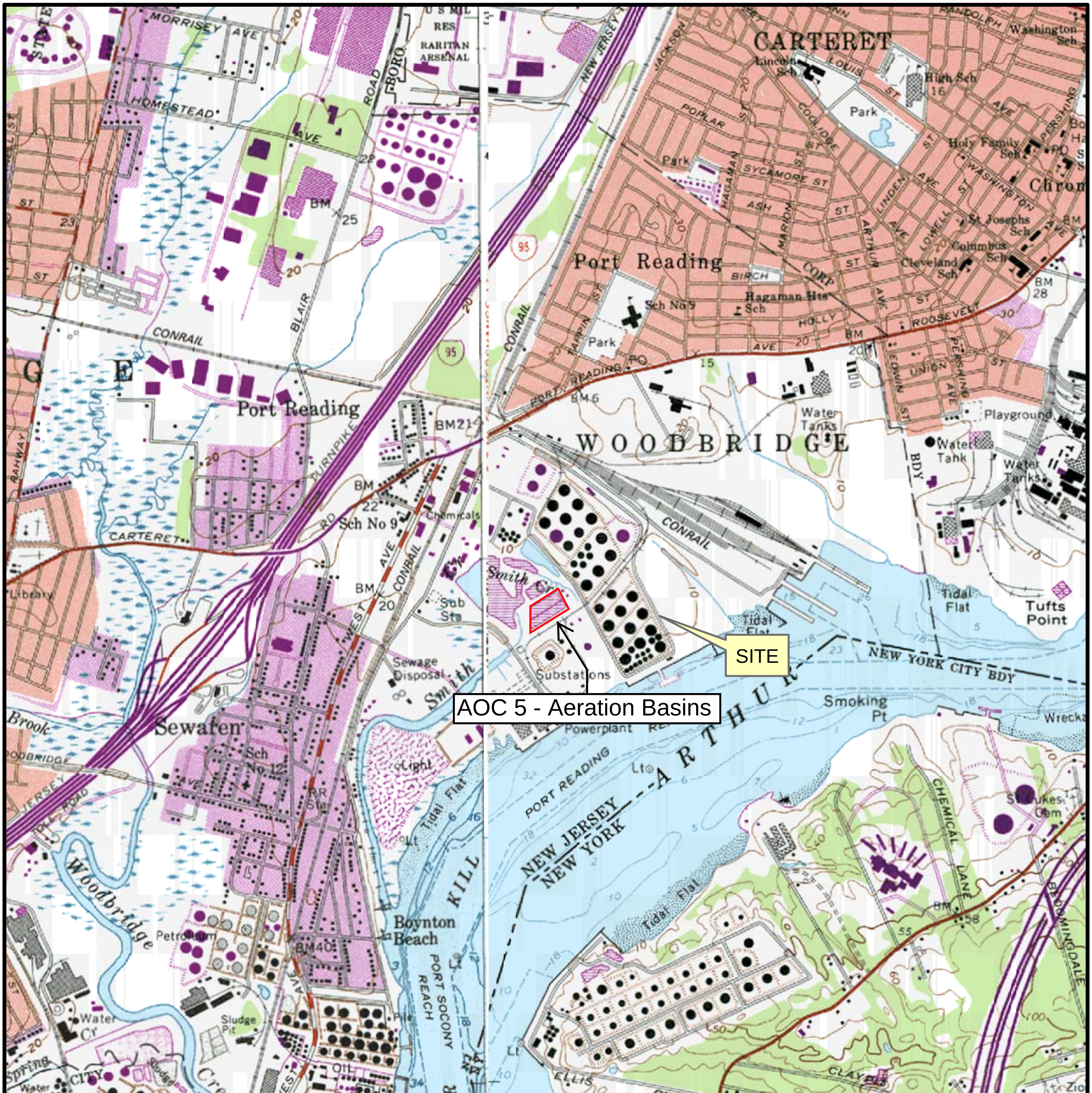
____
[Print name and title]

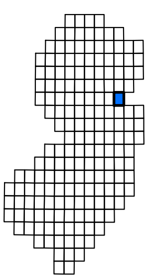
EXHIBIT A

Exhibit A-1: Vicinity Map

Exhibit A-2: Tax Map and Metes and Bounds Description

Exhibit A-3: Property Map





QUADRANGLE LOCATION:
ARTHUR KILL, NEW JERSEY

0 1,000 2,000 4,000 6,000 8,000 Feet

N W E S

Exhibit A-1	Vicinity Map HESS CORPORATION 750 CLIFF ROAD PORT READING, NEW JERSEY	DRAWN BY: B.J.S. DATE: 7/15/10	EnviroTrac ENVIRONMENTAL SERVICES 400E CORPORATE COURT, So. PLAINFIELD NJ 07080 PHONE: (908)757-1900 FAX: (908)757-0017

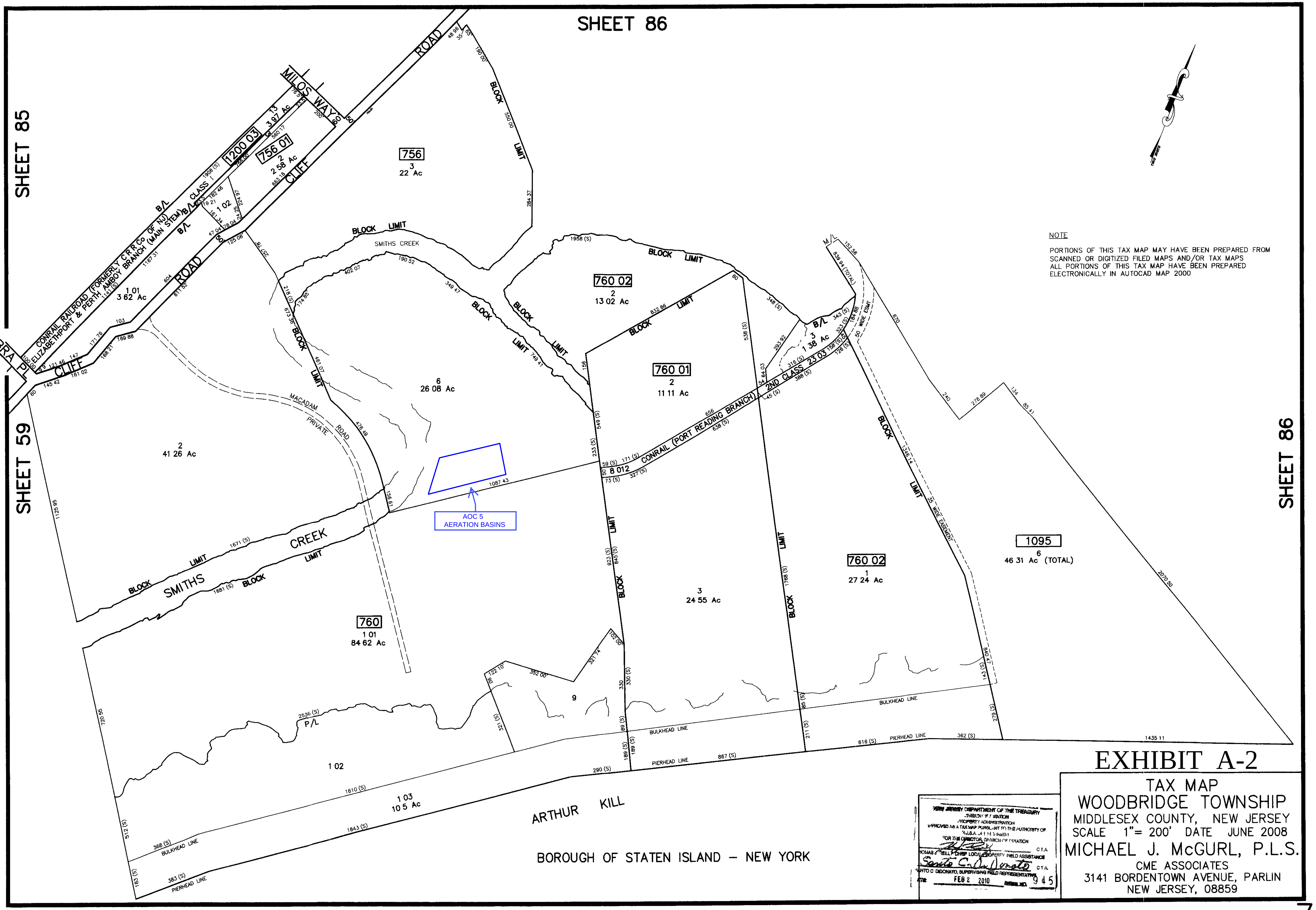
Exhibit A-2: Metes and Bounds

ALL that certain tract, lot and parcel of land lying and being in the unincorporated Community of Port Reading, Township of Woodbridge, County of Middlesex and State of New Jersey, being more particularly described as follows:

The land referred to in this Commitment is commonly known as Block 760 Lot 6 on the Tax Map, Township of Woodbridge, in the County of Middlesex.

More particularly the parcel of land starting at 40 degrees 33 feet 33.68 inches North; 74 degrees 14 feet 50.10 inches West and continuing 340 feet Northwest (heading 351.51 degrees) to 40 degrees 33 feet 36.91 inches North; 74 degrees 14 feet 50.33 inches West, and continuing 468 feet Northeast (heading 55.47 degrees) to 40 degrees 33 feet 39.43 inches North; 74 degrees 14 feet 45.43 inches West, and continuing 319 feet Southeast (heading 145.32 degrees) to 40 degrees 33 feet 37.03 inches North; 74 degrees 14 feet 43.13 inches West, and continuing 663 feet Southwest (heading 235.92 degrees), to the place whence begun.

72


SHEET 86
SHEET 85
SHEET 59
SHEET 86
NOTE
PORTIONS OF THIS TAX MAP MAY HAVE BEEN PREPARED FROM SCANNED OR DIGITIZED FILED MAPS AND/OR TAX MAPS ALL PORTIONS OF THIS TAX MAP HAVE BEEN PREPARED ELECTRONICALLY IN AUTOCAD MAP 2000
CONRAIL RAILROAD (FORMERLY C.R.R.Co. OF N.J.) ELIZABETHPORT & PERTH AMBOY BRANCH (MAIN STEM)
CLIFF ROAD
MILOS WAY
DEBRA PL
756
3
22 Ac
756.01
2
2.58 Ac
1200.03
13
3.97 Ac
1.01
3.62 Ac
1.02
SMITHS CREEK
BLOCK LIMIT
6
26.08 Ac
2
41.26 Ac
MACADAM PRIVATE ROAD
AOC 5
AERATION BASINS
760.02
2
13.02 Ac
760.01
2
11.11 Ac
CONRAIL (PORT READING BRANCH)
2ND CLASS 23.03
8.012
3
1.38 Ac
3
24.55 Ac
760.02
1
27.24 Ac
1095
6
46.31 Ac (TOTAL)
50' WIDE EASEMENT
760
1.01
84.62 Ac
9
1.02
1.03
10.5 Ac
BULKHEAD LINE
PIERHEAD LINE
P/L
ARTHUR KILL
BOROUGH OF STATEN ISLAND - NEW YORK
NEW JERSEY DEPARTMENT OF THE TREASURY
DIVISION OF TAXATION
PROPERTY ADMINISTRATION
FOR THE DIRECTOR, DIVISION OF TAXATION
C.T.A.
FEB 2 2010
945
EXHIBIT A-2
TAX MAP
WOODBRIDGE TOWNSHIP
MIDDLESEX COUNTY, NEW JERSEY
SCALE 1"= 200' DATE JUNE 2008
MICHAEL J. McGURL, P.L.S.
CME ASSOCIATES
3141 BORDENTOWN AVENUE, PARLIN
NEW JERSEY, 08859

72

EXHIBIT
A-3

HESS CORPORATION
750 CLIFF ROAD
PORT READING, NEW JERSEY

PROPERTY MAP

DRAWN BY: CM

REVISION DATE: 12/29/14

0 100
SCALE IN FEET

EnviroTrac
ENVIRONMENTAL SERVICES
6 TERRI LANE, SUITE #350, BURLINGTON, NJ 08016
PHONE: (609)387–5553 FAX: (609)387–5533

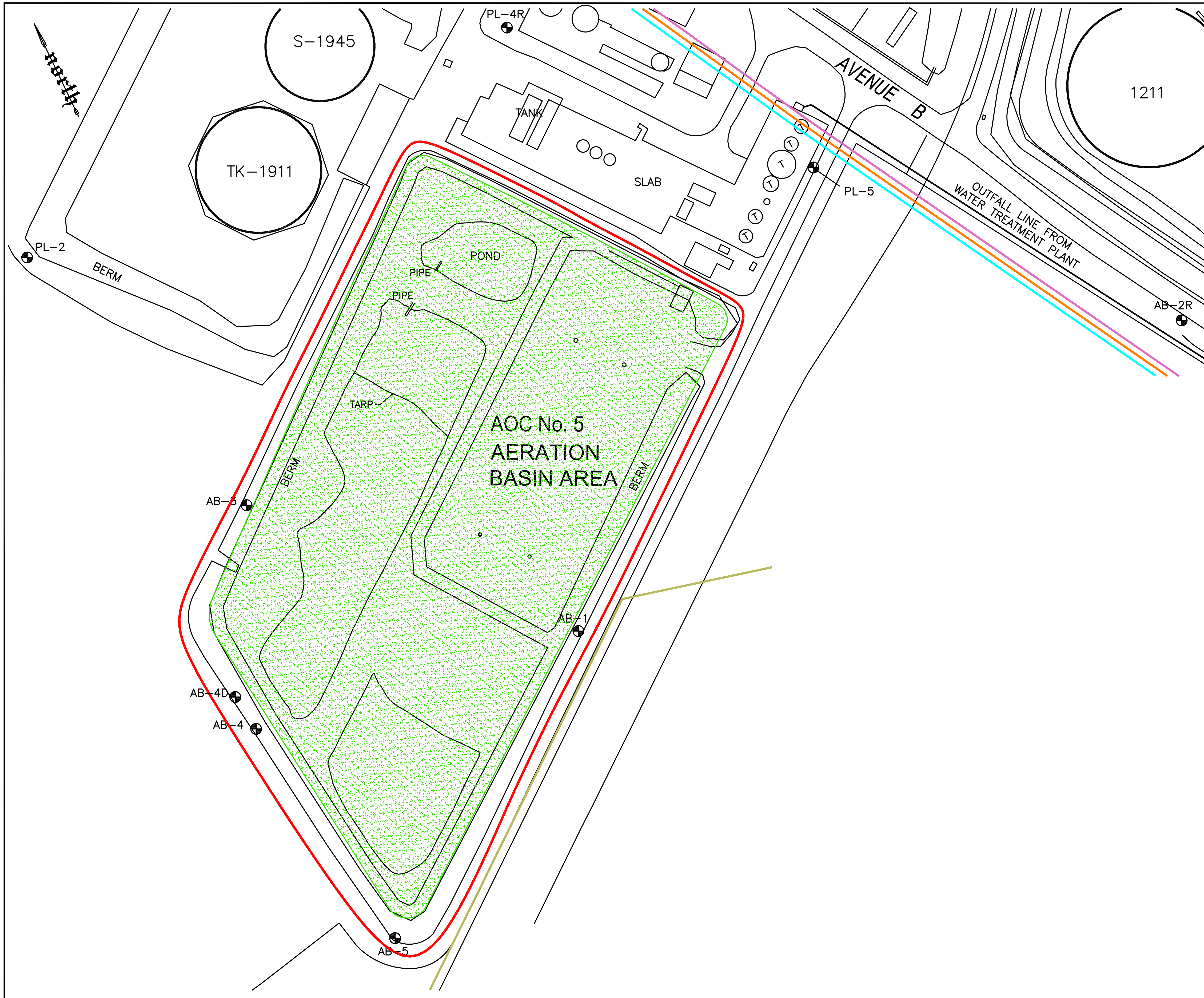
EXHIBIT B

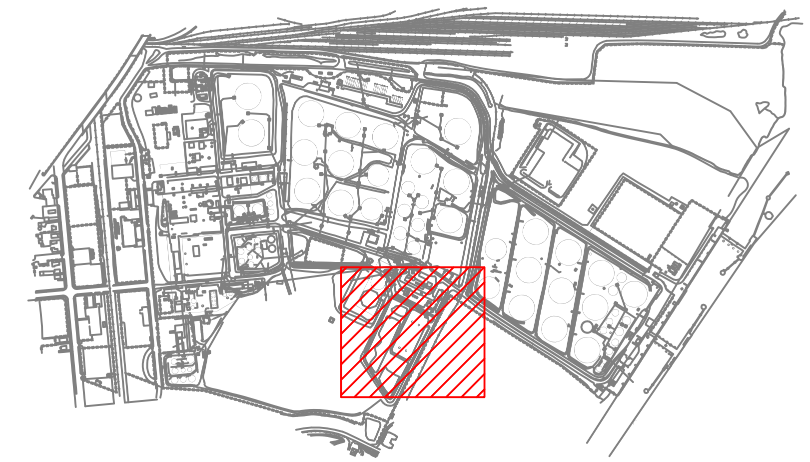
Exhibit B-1(A): Restricted Use Area Map

Exhibit B-1(B): Restricted Use Area Engineering Control Map

Exhibit B-1(C): Soil Boring Location Map

Exhibit B-2: Restricted Area Data Table





LOCATION MAP
(NOT TO SCALE)

LEGEND

- MONITORING WELL LOCATION
- TRANS CONTINENTAL PIPELINE
- MOBILE PIPELINE
- 12" TEXAS EASTERN
- 10" TEXAS EASTERN
- RAILROAD
- FENCE
- VEGETATIVE/GRASS COVERING CAP

EXHIBIT
B-1A

HESS CORPORATION
FORMER HESS PORT READING COMPLEX
750 CLIFF ROAD
PORT READING, NEW JERSEY

HESS

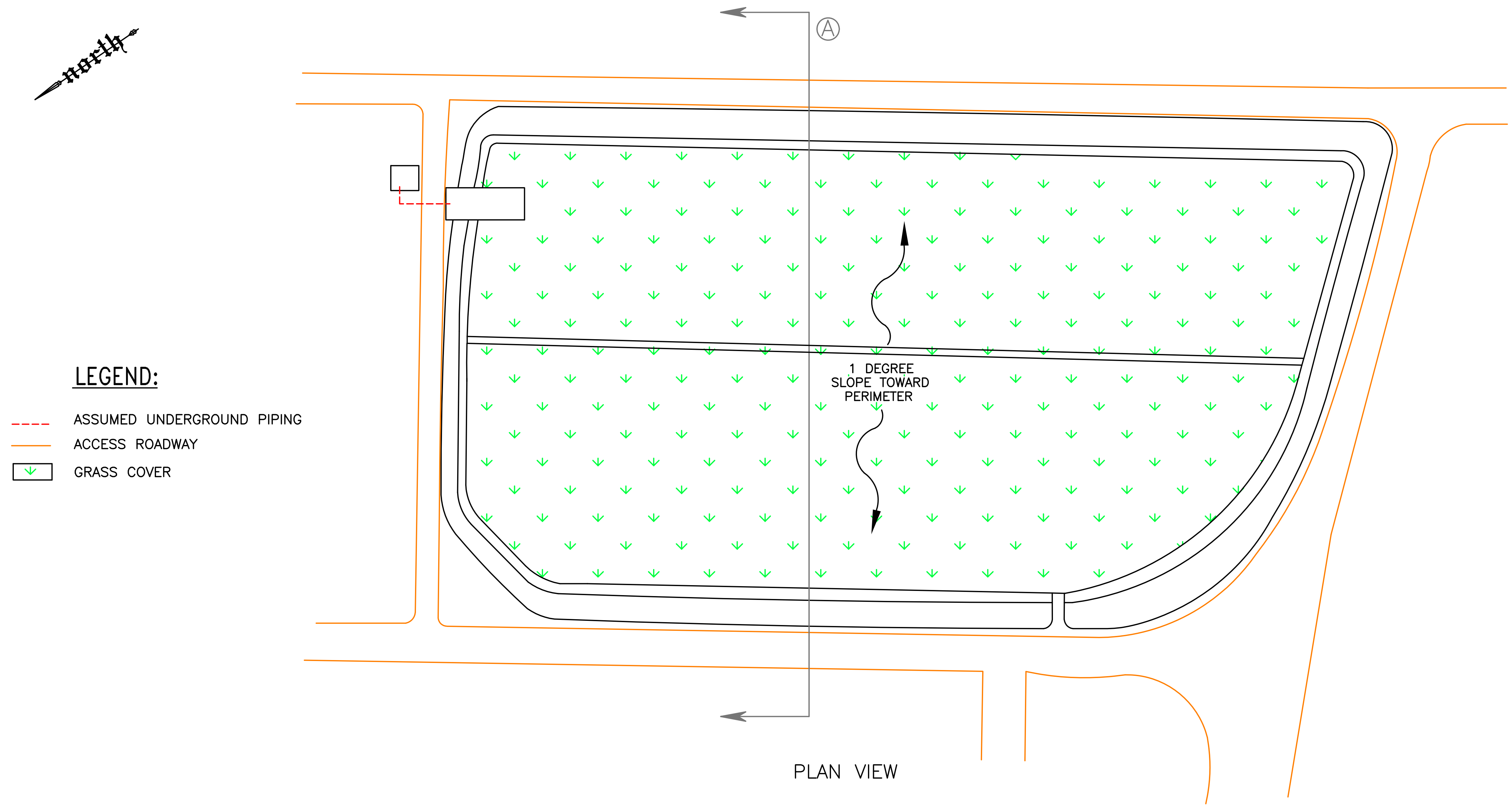
AOC 5 – AERATION BASINS
RESTRICTED AREA MAP

DRAWN BY: KN

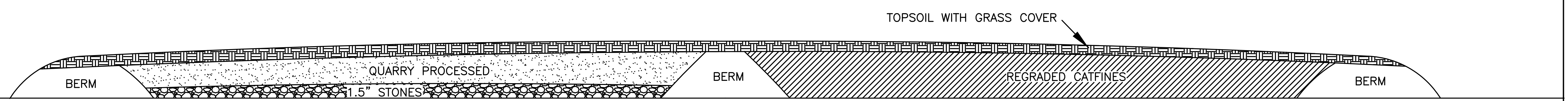
REVISION DATE: 1/22/15

0 100
SCALE IN FEET

EnviroTrac
ENVIRONMENTAL SERVICES
6 TERRI LANE, SUITE #350, BURLINGTON, NJ 08016
PHONE: (609)387–5553 FAX: (609)387–5533



PLAN VIEW



SECTION A

EXHIBIT

B-1B

FORMER HESS PORT READING COMPLEX
750 CLIFF ROAD
PORT READING, NEW JERSEY

RESTRICTED USE AREA
ENGINEERING CONTROL MAP

DRAWN BY: KN

REVISION DATE: 12/10/2014

NOT TO SCALE

EnviroTrac
ENVIRONMENTAL SERVICES

6 TERRI LANE, SUITE #350, BURLINGTON, NJ 08016
PHONE: (609)387-5553 FAX: (609)387-5533

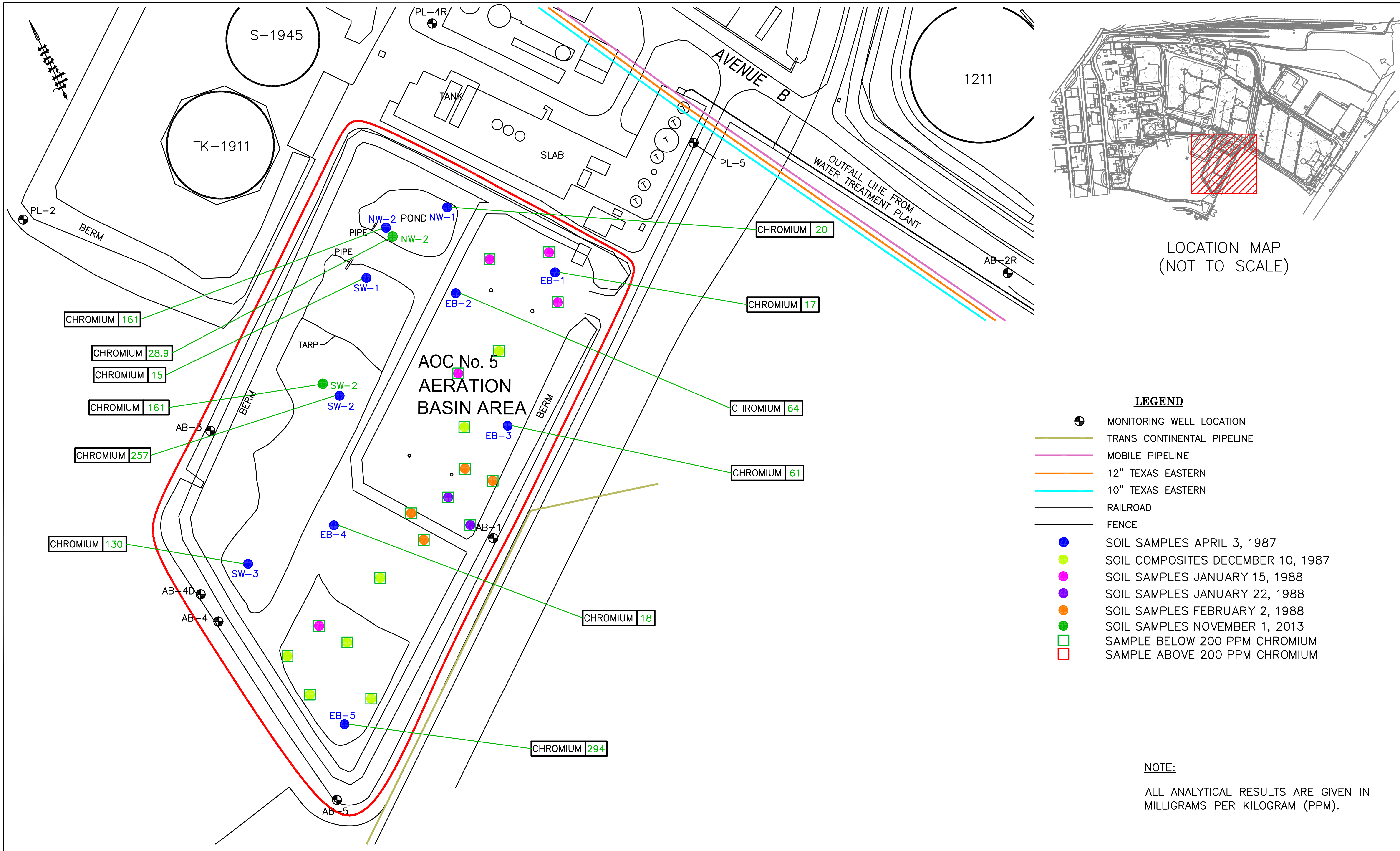


EXHIBIT B-1C	HESS CORPORATION FORMER HESS PORT READING COMPLEX 750 CLIFF ROAD PORT READING, NEW JERSEY	SOIL BORING LOCATION MAP DRAWN BY: KN REVISION DATE: 1/22/15	0 100 SCALE IN FEET	EnviroTrac ENVIRONMENTAL SERVICES 6 TERRI LANE, SUITE #350, BURLINGTON, NJ 08016 PHONE: (609)387-5553 FAX: (609)387-5533

EXHIBIT B-2
RESTRICTED AREA DATA TABLE

Chromium (CSARN 7440-47-3)

Sample Number	Sampling Date	Estimated Sample Elevation (MSL)[1]	Chromium (mg/kg)
NW-1	04/03/1987	13.0-12.5	20
NW-2	04/03/1987	13.0-12.5	161
SW-1	04/03/1987	13.0-12.5	15
SW-2	04/03/1987	13.0-12.5	257
SW-3	04/03/1987	13.0-12.5	130
EB-1	04/03/1987	13.0-12.5	17
EB-2	04/03/1987	13.0-12.5	64
EB-3	04/03/1987	13.0-12.5	61
EB-4	04/03/1987	13.0-12.5	18
EB-5	04/03/1987	13.0-12.5	294
Not Available	12/10/1987	13.0-12.5	<200
Not Available	12/10/1987	13.0-12.5	<200
Not Available	12/10/1987	13.0-12.5	<200
Not Available	12/10/1987	13.0-12.5	<200
Not Available	12/10/1987	13.0-12.5	<200
Not Available	12/10/1987	13.0-12.5	<200
Not Available	12/10/1987	13.0-12.5	<200
Not Available	01/15/1988	13.0-12.5	<200
Not Available	01/15/1988	13.0-12.5	<200
Not Available	01/15/1988	13.0-12.5	<200
Not Available	01/15/1988	13.0-12.5	<200
Not Available	01/15/1988	13.0-12.5	<200
Not Available	01/22/1988	13.0-12.5	<200
Not Available	01/22/1988	13.0-12.5	<200
Not Available	02/02/1988	13.0-12.5	<200
Not Available	02/02/1988	13.0-12.5	<200
Not Available	02/02/1988	13.0-12.5	<200
Not Available	02/02/1988	13.0-12.5	<200
NW-2	11/1/2013	13.0-12.5	28.9
SW-2	11/1/2013	13.0-12.5	161
NJDEP Residential Chromium Soil Cleanup Criterion			**NA**
NJDEP Non-residential Chromium Soil Cleanup Criterion			**NA**
		Average Concentration:	**102**

[1] Feet Above Mean Sea Level
mg/kg - milligram per kilogram
CASRN - Chemical Abstracts System Registration Number
NA - Standard not available

EXHIBIT C
DEED NOTICE AS INSTITUTIONAL CONTROL AND PERMEABLE CAP AS ENGINEERING CONTROL

Exhibit C-1: Institutional Control

Exhibit C-1(A): Description and Estimated Size

The former Aeration Basins are located along the southeastern boundary of the refinery property, and were used for secondary treatment of refinery process waste water and storm water from 1958 until 1983. The Aeration Basins occupy a roughly rectangular parcel of land that is situated on Block 706, Lot 6, of Woodbridge Township, Middlesex County, and encompasses an area of approximately 4.1 acres. Their location is illustrated on **Exhibit A-3.**

Exhibit C-1(B): Description of Restrictions on Property

By operation of this Deed Notice, a permeable cap has been constructed. Additionally, a 30-year Post Closure Monitoring Program will be instituted, with monthly inspection of the cap, and annual groundwater monitoring of six (6) permanent monitoring wells.

Exhibit C-1(C): Objective of Restrictions

The Deed Notice serves to notify current and future site occupants of the presence of the former Aeration Basins. The permeable cap will reduce or eliminate the migration of constituents and function as infiltration control, erosion and runoff control, as well as wind erosion control.

Exhibit C-2 Engineering Control – Permeable Cap and Groundwater Monitoring

The engineering control includes approximately seven (7) feet of non-hazardous material (re-graded refinery process waste “catfines” and quarry process) completely covering the area of the former Aeration Basins. This overburden will be capped by a one (1) foot layer of topsoil planted with grass.

Monthly inspections will be undertaken for the duration of the 30-year Post Closure Monitoring Plan. The inspector will check for signs of damage and deterioration, and when necessary, corrective actions will be undertaken to maintain the integrity of the cap. A logbook will be kept, detailing the dates and details of inspections, along with any corrective actions taken. Inspections will be conducted by an individual familiar with post-closure care requirements.

Groundwater monitoring will be undertaken at six (6) monitoring well locations (AB-1, AB-2R, AB-3, AB-4, AB-4D, and AB-5). Groundwater sampling will be conducted and reported annually for 30 years. Analysis will be completed for Total Compound List (TCL) Volatiles with a library search for Tentatively Identified Compounds (TICs), TCL semi-volatiles with a library search for TICs, ammonia, pH, and hexavalent chromium.

EXHIBIT C
DEED NOTICE AS INSTITUTIONAL CONTROL AND PERMEABLE CAP AS ENGINEERING CONTROL

The Deed Notice, pursuant to N.J.A.C. 7:26C-7.2, will utilize institutional and engineering controls to allow the property to continue to operate as an industrial facility while protecting the public and environment from exposure to the assumed compounds usually associated with historic fill. No change in property use, or disturbance of soil that would result in unacceptable exposure to impacted soil, is permitted without NJDEP approval.